



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

### Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

### About Google Book Search

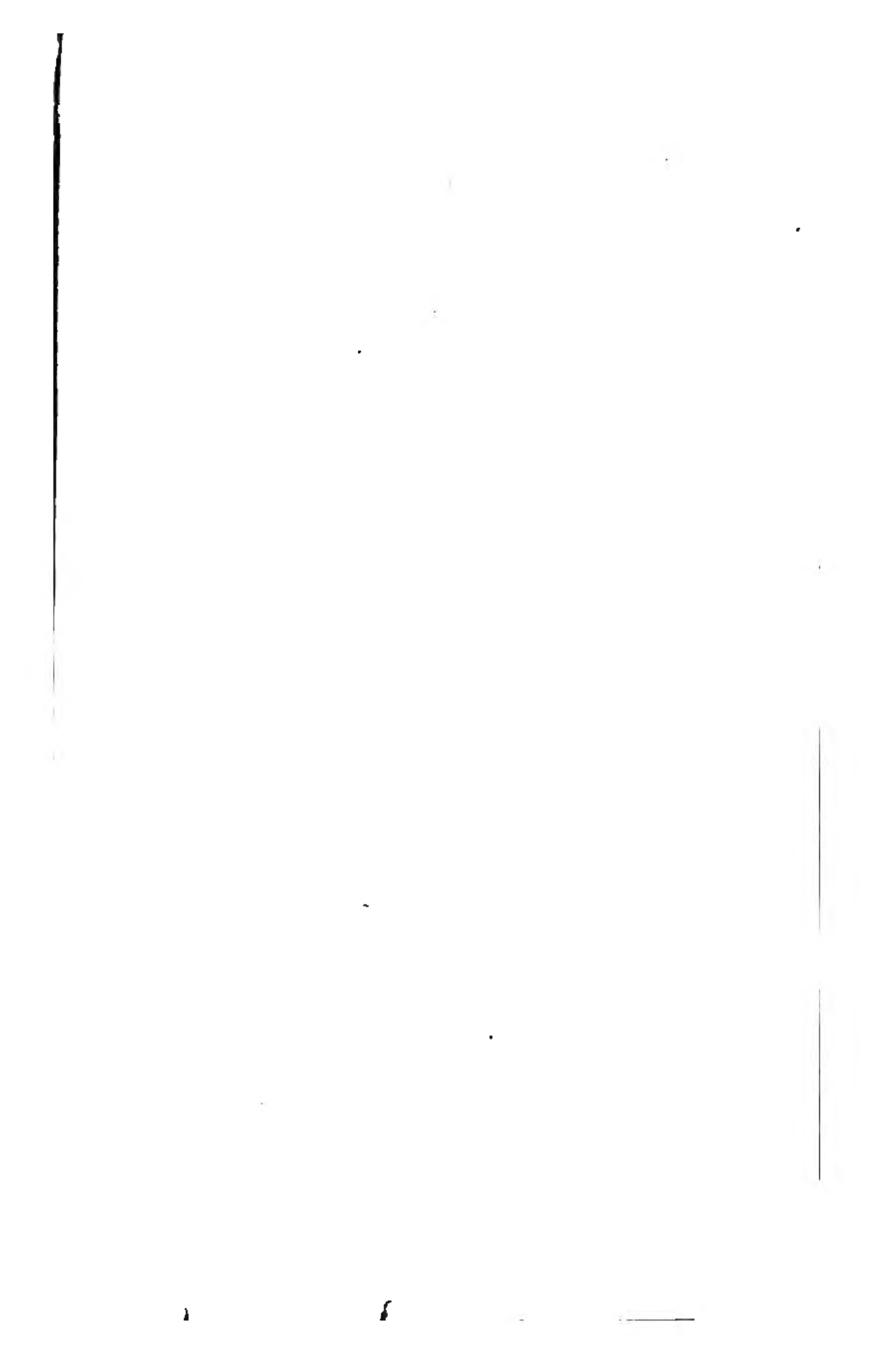
Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



A  
Scotia  
Mc War  
nes Dep





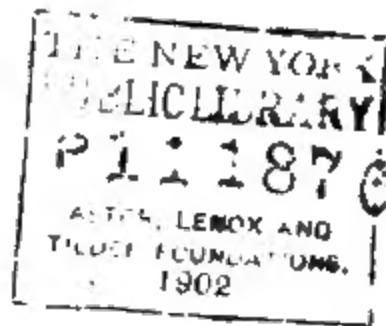




Dept. of Mines

# REPORT

OF THE



# CHIEF COMMISSIONER OF MINES

FOR THE

PROVINCE OF NOVA SCOTIA,

FOR THE YEAR 1871.

---

HALIFAX, N. S.

PRINTED BY THE CITIZEN PUBLISHING COMPANY.

1872.



**REPORT**  
**OF THE**  
**CHIEF COMMISSIONER OF MINES**

**FOR THE**  
**PROVINCE OF NOVA SCOTIA,**

**FOR THE YEAR 1871.**

**HALIFAX, N. S.**

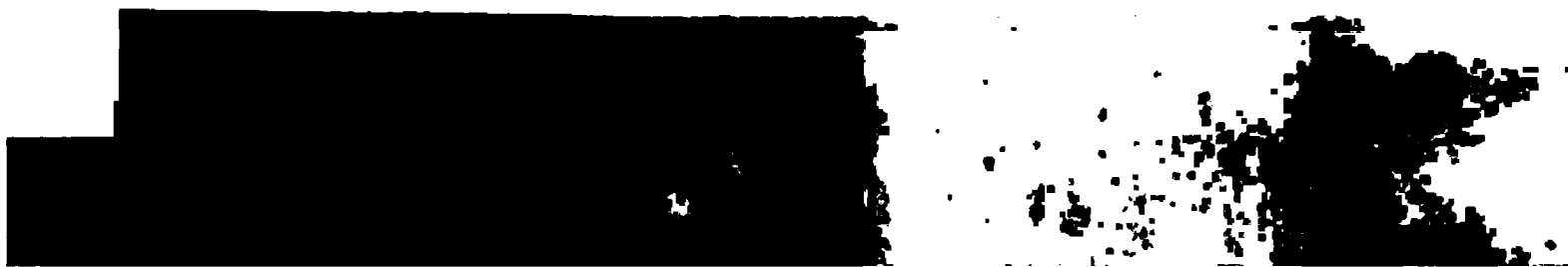
**PRINTED BY THE CITIZEN PUBLISHING COMPANY.**

**1872.**

*MAH*

THE NEW YORK  
PUBLIC LIBRARY  
#111076  
ASTOR LENOX AND  
TILDEN FOUNDATION  
1902

NOV 23 1964  
LIBRARY  
YASRU



# REPORT.

---

DEPARTMENT OF MINES,

Halifax, February 8, 1872.

SIR,—

I have the honor to submit, for the information of His Excellency the Lieutenant Governor, the customary Report respecting the Mines of this Province for the year ending December 31st, 1871.

It is gratifying to be enabled to state that there has been a satisfactory increase over that of last year in the products of the Collieries, in each of the Coal Mining centres. In Cumberland County there was an increase this year over the Coal mined last year of 3500 tons; in Pictou of 19,000 tons; and in Cape Breton of 15,000 tons: the total increase in the quantity of round Coal mined during the year being 33,000 tons. This increase, it is significant to notice, was obtained during an unusually short working season, which was brought to an end sooner than is customary, by the closing of navigation very suddenly and early, and the setting in of severe weather in November last. The increase above reported would, of course, have been much greater had the season been of the ordinary and average character.

The Gold mines have been worked steadily, and in many cases profitably. The returns, indeed, shew a small decrease in the yearly standard of production; but they are quite as good as could be expected, taking into consideration the scarcity of men and the consequent high price of labour. There has, perhaps, been no year since the commencement of Gold mining in this Province during which the business has been of a more legitimate character than it was in 1871; there has been no unhealthy speculations, and the losses

generally have been small, whilst in some cases the profits have been large. I still have to regret the absence of improvement in the appliances for amalgamating and saving Gold. It is also a matter of regret that there are a number of mines, which have been proved capable of being worked at a profit, have been allowed from one cause or another to remain idle. In one or two instances efforts are in progress to remedy this inaction, but to what extent it would now be premature to judge. In the following special references to Gold-mining Districts, it seems advisable to state the names of the Mines or those of the owners of the more prominent areas, with the amounts produced.

### STORMONT.

In this District there have been three mines worked. These are of "The United Mining Association (Limited)," that of "The Associated Mining Company (Limited)," and the Johnston's Brook Mine. The United Mining Association Mine has been worked continuously through the year; but hitherto not so successfully as was anticipated, owing to the defective manner in which it was first opened. A very large excavation was made at the surface, and the sides thereof being insufficiently secured, caved in, by which the surface drains were destroyed and the mine flooded. A tunnel has now been made to carry off the surface water as it collects, and the Mine is again in working condition. The area is easily mined, the quartz is improving in quality, exists in large quantities, and may now be expected to be remunerative. The quantity crushed by the Association amounted to 1483 tons yielding 282 oz. of Gold.

On the Consolidated Mining Company's Mine, work began in May last. This mine is on a continuation of the same band of lodes worked by the United Mining Association, and has so far proved remunerative, with good prospects for the continuance of prosperous results. The quartz of both these mines is crushed at the mill owned by the United Mining Association, which is driven by water



power, and is about half a mile from the mines of both Companies.

There were crushed from the Consolidated Company's Mines 306 tons of quartz, yielding 239 oz. of Gold.

The Mine at Johnston's Brook was worked until the month of May. There being a number of owners and a large expenditure becoming necessary for a Crusher and other acquirements, it was thought desirable to have a better organization of the Company before such further expenditure should be made. This it is proposed to accomplish by an Act of Incorporation, for which application will be made to the Legislature, without delay. The

## SHERBROOKE.

In this District there have been 5 Mines kept constantly at work during the year; viz., the Wellington, the Sherbrooke, Dominion, Palmerston, and a small mine wrought by Messrs. McClure and Snow.

In the "Meridian" and "Wentworth" Mines and James H. McDonald's Mine, work was commenced in April. In John McDaniel's and Newell Snow's areas work began in July, and all of them were in full operation at the end of the year. There has also been considerable prospecting and mining in a desultory way done during the summer. In the months of August, and September, the Deputy Commissioner's returns show 18 mines at work.

The principal amount of the work has been done, and the largest part of the Gold obtained by the Wellington, Sherbrook, Dominion, Palmerston, Caledonia, and Wentworth Companies, the returns show the following result:

The "Wellington" raised and crushed 2095 ton of quartz yielding 1385 ozs. of Gold. The "Sherbrooke," 1698 tons, yielding 1696 ozs. The "Dominion," 2580 tons yielding 637 ozs. The "Palmerston," 4048 tons, yielding 805 ozs. The "Caledonia," 367 tons, yielding 502 ozs., and the "Wentworth," 2542 tons, yielding 736 ozs. There are some other mines wherein the amounts obtained, though small, do not show unfavorably. The "Cleverdon" crushed 38 tons of quartz, yielding 99 ozs. of Gold. The "Meridian" Company, 85 tons yielding 132 ozs., James H. McDonald's Mine, 67 tons, yielding 136 ozs. The Mine wrought by McClure & Snow, 25 tons, yielding 129 ozs. Snow's Mine, 42 tons, yielding 35 ozs. John McDaniel's Mine, 50 tons, yielding 28 ozs. The returns from the whole district show that 14,382 tons of quartz were crushed yielding 6570 ozs. of Gold, the result of the labour of 171 men; which is equal to \$711 to each.

## TANGIER.

Tangier, one of the oldest of our Gold mining fields produced more Gold in this, than any previous year. The "Strawberry Hill," "Humber," "Forrest," and "Froud" Mines have been wrought continuously throughout the year, and the "Burlington" also, except in the June quarter. The Strawberry Hill produced more than half the amount raised in the district, viz., 1212 tons of quartz, yielding 1154 ozs. 09 dwts. of Gold, the "Humber" produced 789 tons, yielding 416 oz. 10 dwts., the "Burlington" 388 tons, yielding 180 oz., the "Forrest" 198 tons, yielding 164 oz. 15 dwts., and the "Froud" 220 tons, yielding 109 oz. of Gold. Some Gold was obtained also from other small lots, making the total returns for the year, from Tangier, 2924 tons of quartz crushed, yielding 2093 oz. of Gold, by 88 men, and showing an average of \$440 to each.

## MONTAGU.

In this District, two Companies, those of Messrs. W & E Lawson, and Taylor & Company, have been at work continuously throughout the year, and in June another Mine was opened by Brown & Barker, on tribute; it is owned by the "Montreal Exploration Company" and work still proceeds in it. The amounts obtained by each enterprise are as follows: Lawson & Co, 468 tons of quartz, yielding 2272 oz 17 dwt 10 grs of gold; Taylor & Co, 309 tons, yielding 724 oz. 13 dwt 10 grs., Brown & Baker, 67 tons, yielding 154 oz. 07 dwts. 21 grs. These with the proceeds of some other small lots make a total of 848 tons of quartz, yielding 3152 oz. 08 dwts. 15 grs. of Gold, obtained by labor of 51 men, giving an average to each of \$1143.52.

This District has always been characterized as giving the largest average yield per ton of any of the Gold fields. The lodes worked are small but a great number of larger lodes can be traced showing Gold which will no doubt be ultimately worked at a profit.

## WAVERLY.

In this District two mines have been steadily worked during the past year ; one by the " Lake Major " Company, and the other by the " American Hill " Company. The " Burkner " mine has been worked a part of the year.

The Lake Major Company crushed 1485 tons of quartz, giving 993 oz. of Gold ; the " American Hill " 997 tons, giving 363 oz. 16 dwts. of Gold ; and the " Burkner " mine 260 tons, yielding 71 oz. of Gold, in all 2742 tons quartz, yielding 1427 oz. 8 dwts. 12 grs. of Gold, raised by 56 men ; showing an average to each of \$471.72.

## OLDHAM.

The mining operations in this District during the year were rather of a fluctuating character, over 25 different parties were at work. The principal part of the mining was done by the " St. Andrew's Company," which crushed 381 tons of quartz, giving 649 oz. of Gold ; the Sterling Company 384 tons, yielding 454 oz. ; Doyle & Horne 35 tons, yielding 224 oz. ; and R. G. Fraser 110 tons, yielding 153 oz. The others obtained varying quantities from a few grains up to 47 oz. of Gold, the whole results for the year were 1374 tons of quartz crushed, yielding 1718 oz. 12 dwts. 12 grs. of Gold, mined by 43 men, giving thus to each an average of \$739.41.

## RENFREW.

Renfrew District continued in almost the same condition as in the previous year. The " Ophir " Company's returns show 1436 tons of quartz crushed, yielding 625 oz. of Gold ; the " Hartford " 494 tons, yielding 383 oz. The " New Haven " and " Renfrew " mines yielded smaller amounts. Only the foregoing Companies were at work, and the full returns from all were 900 tons of quartz crushed, yielding 360 ounces of Gold ; there being on the average 36 men employed.

### UNIACKE:

Little has been done in this District during the past year. Several fresh mining attempts were made, but apparently without vigor ; although in some cases appearances seemed to warrant success. The results of the year's labour were 900 tons of quartz crushed, yielding 360 oz. 17 dwts. of Gold, obtained by 14 men ; which gives an average of \$476.83 to each.

### CARIBOU.

In this District Mr. Touquoy's mine is the only one that has been continuously worked during the year ; he has crushed 384 tons of quartz, yielding 405 oz. of Gold. Mr. Josiah Jennings crushed 39 tons, giving 68 oz., and Mr. Robert Taylor 36 tons, giving 26 oz. 15 grs. ; which were all the attempts at mining of any importance. Preparations are now in progress to work the Bushing mines.

The yield for the year is 479 tons of quartz, giving 304 oz. 16 grs. of gold, being an average for the 10 men employed of \$933.88.

### UNPROCLAIMED AND OTHER DISTRICTS.

The proceedings for the year have not been of much importance. At Gay's River there is a crushing mill now a building, and another at Beaver Dam was licensed during the summer. The Yarmouth mill has done but little. The remaining mills throughout the Province have been idle. The whole results are 281 tons of quartz crushed, yielding 112 oz. of Gold.

The usual statistical information collected from the official mining returns will be found appended in the form of tables arranged as clearly and as concisely as possible, for the purposes of comparison and general reference.

The Report of the Inspector of Mines is also subjoined, and possesses information on the general condition of our mining industries of great importance and interest. It is

but proper to remark here that the recent resignation of the Inspectorship of Mines by Mr. Rutherford, who enters on a new career in connection with one of our foremost Coal-mining Companies, has deprived the Department of a highly efficient, active and valuable officer. Arrangements are under consideration by the Department for such a re-adjustment of the duties of the office of Inspector of Mines as will economize public expenditure and bring the work of inspection up to the very latest requirements of mining enterprise.

In reference with the mining capabilities of Nova Scotia, it is worthy of remark that an admirable representation of these in all their great variety and comparative economic value exists in the noble geological and mineralogical collections in the Provincial Museum. While the other-resources of the Province are represented, and the usual varying departments appropriate to a museum are to be found therein, the geological department is pre-eminently the most valuable feature of the whole. It has been enriched by one of the best collections ever made in the Province; additions are constantly made, and all have been arranged with such scientific care as to afford a most complete view of the geological aspects of the Province, especially in reference to the products of its mines. Dr. Honeyman's Report will give a more detailed description of the value of the Provincial Museum.

I cannot close this Report without urging the necessity there exists for the establishment of a School of Mines for the Province. To her mineral riches mainly Nova Scotia must look more and more every year for the sources of progress and prosperity. But unscientific mining must in Nova Scotia be always comparatively unproductive. The Gold fields of this country show no alluvial lotteries where luck may dispense with skill. The gold-bearing quartz of the country forms a remunerative investment for capital, which is scientifically applied and intelligently managed, but mere ignorant labour has hitherto proved for the most part fruitless labour. To attract foreign capital to our mines, and

afterwards to extend manufactures, give greater safeguards to our own native capital flowing in the same direction, and to find lucrative employment for a growing mining population, are those requirements of our present position which can be best satisfied by a more general diffusion of accurate information regarding our mineral resources and the right modes of reaching and working them. For this purpose a School of Mines, wherein practical and economic geology could be studied, where the Mineralogy of the Province could be properly defined, and where the best technical mining education could be imparted, would be of the highest value to our population, and would lead far more rapidly to the proper development of the mining resources of the whole country. I trust, therefore, that the earliest available opportunity will be taken to commence the establishment and equipment of a Provincial School of Mines.

WILLIAM GARVIE.

HON. W. B. VAIL,

PROVINCIAL SECRETARY.

# INSPECTORS' REPORT.

---

DEPARTMENT OF MINES,  
Halifax, January 26th, 1872.

SIR,—

In submitting the following Report on the mining operations in the Province during the past year, I have pleasure in again noting an increase in the sale of coal. The aggregate sales exceed those of last year 28,142 tons, the increase in the sale of round coal being 38,189 tons. The operations notwithstanding, have been of that diversified character which has prevailed for the last two or three years. Fluctuation in the production of the mines is again a noticeable feature; in some it exceeds and in others it is below that of last year. Whilst too, some have remained unworked, some have been more fully developed; and new mines are being rapidly brought into operation. The workings at most of the mines have been so slightly extended that beyond a notice of the locality of the mine in which they have been carried on, they present little for special remark. The regularity with which in most cases they are now conducted in the coal mines, owing to the few difficulties met with is a gratifying circumstance, which would, however, be still more so if the operations were on a par with the capabilities of the mines. In

## CUMBERLAND COUNTY

the principal part of the mining has as hitherto been at the

JOGGINS,

in which mine the workings have been carried on in the usual manner, and in the same locality of the mine as last year, there having been no further extension of the levels in an easterly direction.



The operations to which I alluded last year have however been put into execution. A new slope has been driven to the dip near the hoisting shaft. It is now 520 feet in length, and working places are being won out. A steam engine has been erected on the surface to draw the coal up this slope and railway connections are being made to enable the operations at the mine to be concentrated at the new works. On completion this mine will be in a much improved position in all respects.

The returns show an expenditure as follows :

Adits and levels.....	\$4900.00
Surface work.....	910.00
Machinery.....	1600.00
Total.....	<u>\$7410.00</u>

#### MACCAN.

At this mine no change has occurred in the character of the operations; they are still confined to the portion of the mine in which they have been carried on during the last two years; and the production being exclusively for land sale purposes it is limited in quantity. An expenditure is returned on—

Adits and levels .....	\$50.00.
------------------------	----------

#### NEW YORK AND ACADIA.

Mining at this colliery has also been on the same small scale as last year; the workings have therefore been very little extended, and present no change worth noting. The expenditure is stated to be, on—

Adits and levels .....	\$413.25
Machinery.....	600.00
Total .....	<u>\$1013.25</u>

#### SPRING HILL..

In this locality, whilst considerable industry has been exhibited in the extent of the explorations carried on

there has been little actual mining. On the Black and Macfarlane area the operations have been chiefly of an exploratory character, those of last year having rendered it desirable to continue them along the range of the crops of the seams.

A few tons of Coal have been taken out for land sale at a shaft near the crop; no opening of a permanent character has, however, yet been made, the selection of a suitable place having been delayed till the result of the exploration was ascertained.

The following is the expenditure as per returns on the Black area:

Prospecting and Boring.....	\$473 00
And on the Macfarlane areas:	
Shafts .....	\$550 00
Prospecting and Boring.....	586 00
	<hr/>
Total.....	\$1136 00

A series of boring has been carried on by Mr. Livesey in this locality and also in the neighbourhood of Stuart Road, with a view to determine the position of the seams. As these operations are not yet completed little additional knowledge in this respect has been obtained.

### PICTOU COUNTY.

In this County the principal mines have been kept steadily in operation, though not in each case to the same extent as last year. At the

#### ALBION MINES.

the operations have been in both of the seams usually worked. In the Foord pit the main levels have been much extended and the number of working places correspondingly increased. In one of the drifts, which were being driven towards the old workings to the rise, a connection was recently made with them by boreholes and their position having been thus ascertained, the apprehensions which prevailed respecting the body of water in them have been very much allayed. The water is in course

of being run off by the borehole and the workings will, it is expected in a few months, be entirely drained. A Ventilating Fan is about to be erected and other measures are being adopted to place this pit in a most efficient condition in all respects.

In the deep seam, the operations in which have been chiefly in the West District of the mine, arrangements have been completed for a more extensive working to the dip, in the neighborhood of the shaft. A crosscut or shaft has been driven to the dip, and a Steam Engine for hauling the Coal up it has been erected near the bottom of the slope. The Foster pit workings have continued shut off during the year, but there has been nothing to cause fear respecting the fire which rendered it necessary to close the mine. The indications are favorable to the supposition that it is now quite extinguished.

The manufacture of Coke on the open burning principle has for some time been practised at this Colliery. During the past year, however, Coke ovens have been erected and the production of this article is being conducted in the manner practised in England, with an improvement in its quality.

#### ACADIA.

The operations at this colliery have been carried on with great regularity, and the production again exceeds that of last year. The lower levels, won out last year have been considerably extended on each side of the main slope; the operations having been carried on simultaneously in that district of the mine and in the upper levels. Preparations are now being made for driving to the dip for the purpose of opening out another set of levels in connection with the slopes, and thus maintaining the productive capacity of the mine. The expenditure is stated to be as follows :

Surface work.....	\$ 360.73
Machinery.....	1320.58
	<hr/>
Total. ....	\$1681.31

## INTERCOLONIAL.

Although the sales from this mine are not to the extent of last year, the operations have been carried on with steadiness as regards the underground workings. These have been conducted in the usual manner, and have been much extended on each side of the main slope. An additional winning to the dip is about to be made and other steps are being taken to maintain the mine in an efficient condition. An expenditure is returned as follows :

Shafts.....	\$ 429.18
Adits and levels.....	1314.89
Surface work.....	2163.29
Machinery.....	1362.57
Houses.....	2250.17
Total.....	<u>\$7520.10</u>

## NOVA SCOTIA.

This mine has during the year been brought into effective operation by the completion of the railway connecting it with the shipping wharf at Middle River. The workings are being carried on in a systematic manner on each side of the slope, and the mine being now opened on a scale commensurate with the general character of the operations, an increased production may be expected. The returns show an expenditure on,—

Adits and levels.....	\$ 6850.50
Surface work... .	18761.25
Machinery.....	350.00
Houses.....	2636.28
Total.....	<u>\$23098.03</u>

Little has been done on the other mining properties in this county towards an extension of the operations hitherto carried on. On the McBean areas they have been, as last year, confined to the working of a few tons of coal for

land sale—Messrs. Barton and Mitchell have very recently reached the seam towards which an adit was in course of driving last year, and it is now being opened out. An expenditure is returned as follows:

Shafts.....	\$ 80.00
Adits and levels.....	1195.75
Surface work.....	100.75
Prospecting and boring.....	66.00
Total.....	<u>\$1442.50</u>

The Crown Brick and Pottery Company of New Glasgow have continued their operations on the Richardson seam; the slope being now 159 feet in length. At a depth of 134 feet levels have been driven on each side and a few working places won out. A small steam engine has also been erected to haul the coal up the slope. The expenditure has been as follows:

Slope.....	\$ 750.00
Adits and levels.....	500.00
Surface work.....	100.00
Machinery.....	2000.00
Houses.....	900.00
Total.....	<u>\$4250.00</u>

On the Merigomish and Pictou Mining Company's properties, explorations have been made with a view to ascertain the position of the seams, but no regular mining has been carried on.

### CAPE BRETON.

In the Counties of Inverness and Victoria the only mines opened are still the Chimney Corner and the New Campbellton. At

#### CHIMNEY CORNER,

although the sales have not been large, the operations have been steadily carried on. The main slope is now about 400-

feet to the dip, and the levels, which are driven in a south-east direction, vary from 300 to 600 feet in length. An additional boiler has been supplied to the hoisting engine, and other arrangements made for an increased production. The returns give an expenditure on,—

Shafts.....	\$ 185.00
Adits and levels.....	250.00
Surface work.....	1080.00
Machinery.....	8500.00
Houses.....	400.00
<b>Total.....</b>	<b>\$5415.00</b>

At the New Campbellton Colliery no Coal has been raised during the year. The Black Rock, Matheson, and Collins Mines have also been unworked, with the exception of a few tons raised at the last named.

#### SYDNEY MINES.

The usual steadiness in the operations has prevailed at this Colliery; the production being maintained at a very uniform rate. The operations have been of the ordinary character and present nothing requiring special remark. The sinking of the new shaft near Cranberry Head has recently been resumed and arrangements made for a steady prosecution of this important addition to the productive powers of the Colliery. The returns show an expenditure as follows :

Shafts.....	\$3505.58
Surface work.....	1201.08
Machinery.....	709.85
Houses.....	660.00
<b>Total.....</b>	<b>\$6076.51</b>

tended. The general arrangements, too, are more complete and adapted to an increase in the yield of the mine. The expenditure is stated to be on

Shafts and Slopes.....	\$ 5000.00
Adits and levels.....	15012.00
Surface work.....	8000.00
Machinery.....	1800.00
Houses.....	2500.00
Railway and wharf.....	1429.00
Total.....	<u>\$83741.00</u>

#### LINGAN.

At this Colliery the operations have been conducted in the usual manner, and in the same Districts of the mine as hitherto. The extension of the main slope to the dip and the opening of the seam at its extremity by levels on each side has placed this mine in a position to meet an increased demand for Coal. At the Barrasois operations have again been resumed and the slopes are being driven to the dip. The expenditure is returned as follows :

Adits and levels.....	\$5454.48
Surface work.....	194.85
	<u>\$5649.33</u>

#### INTERNATIONAL.

The produce at this Colliery has, during the year, been largely increased, the operations having been carried on with much vigor. The workings have been much extended, an enlarged scale of pillarage has been adopted, and the mine generally is arranged for a steady and large production. During the year a manager's and an additional workman's house has been erected. The returns show expenditure on

Shafts.....	\$ 12.00
Adits and levels.....	3712.56
Surface work.....	850.00
Houses.....	200.00
Total.....	<u>\$4774.56</u>

## CALEDONIA.

The operations at this mine are still on a small scale in comparison with its capabilities of production. They offer little for remark; mining being pursued in the manner practised since the commencement of the Colliery. The removal of some of the pillars has been continued with success and the workings generally are carried on with regularity and system. The expenditure is stated to be on

Shaft, &c.....	\$351.00
Houses.....	427.00
Total.....	<u>\$778.00</u>

## LITTLE GLACE BAY.

This mine also, is, in its yield of Coal, much beneath its means of production. The Hub seam only has been worked; the extension of the workings being chiefly in the district of the mine worked last year; no extension of the levels having been made or further openings of the seam. The returns show an expenditure on

Shafts.....	\$284.48
Adits and levels.....	384.61
Slip and wharf.....	650.80
	<u>\$1219.89</u>

## CLYDE.

Nothing has been done towards the opening of this mine on a larger scale. The extent of the operations is very similar to last year, and the workings are in consequence but slightly extended. An expenditure is returned as follows:

Adits and levels.....	\$600.00
-----------------------	----------

## BLOCK HOUSE.

Operations were suspended at this colliery early in the year, and have not since been resumed. The mine has



however been kept in working order, and mining will, it is expected, be commenced at an early date.

#### GOWRIE.

At this colliery the usual steadiness of the operations has prevailed; the sale of coal however exhibits a deficiency in comparison with last year. In the mine the levels and other working places have been kept regularly going and the position of the mine generally is unaltered with respect to its productive capacity. Another shaft is being sunk near the western boundary of the area, with a view to shorten the lead of coal underground and increase the yield of the mine. In the returns the expenditure is given as follows:

Shafts.....	\$ 210.00
Adits and levels.....	200.00
Surface work.....	202.00
Machinery.....	356.00
Houses.....	280.00
Prospecting and boring.....	120.00
Breakwater.....	3150.00
Total.....	<u>\$4468.00</u>

#### SOUTH HEAD.

Nothing has been done at this mine of any moment during the year. An expenditure is returned on,—

Surface work.....	\$654.29
-------------------	----------

#### GARDENER.

The operations at the Gardener colliery, which consists of the sinking of a shaft, were suspended early in the year; it being considered desirable to effect a winning at a point farther to the dip than was at first projected. No steps have, however, been taken towards this object. The returns show an expenditure as follows:

Shafts.....	\$175.00
Machinery.....	120.00
Houses.....	75.00
Total.....	<u>\$370.00</u>

At the other localities in the County of Cape Breton, in which preparatory mining operations were in hand last year, no further progress has been made. A considerable development of mining property has, however, taken place on the route of the Glasgow and Cape Breton Railway, the construction of which was commenced in the early part of the year. This line of railway passes through a district which has hitherto had no means of access to the seaboard, and the seams of Coal which it contains have therefore remained unopened. The vigor with which the line has been pursued will be appreciated from the fact that ten miles of road have been made since Feb. 7, last. The track is of narrow gauge being only 3 feet in width. At the distance named it is connected with the Reserve area, on which mining operations have also been conducted with highly creditable energy. The seam of Coal opened is the Phelan, and is the same as that worked at the Caledonia Colliery. A pair of slopes have been driven to the dip in a diverging direction. One of these, the North one, is now 700 feet in length, and the other is 350 feet down. Levels have been turned and working places won out; and the interior arrangements of the mine are being rapidly prepared for extensive operations. On the surface the usual erection for screening the Coal has been completed. An Engine-house, in which a 60 Horse-power Engine is about to be placed, has been built; twelve blocks of two houses each, stable and barn, Smith's and Carpenter's shops, Foreman's and Manager's houses, Powder Magazine, &c., have been erected and the usual equipments of a mining establishment are being provided. The returns show an expenditure as follows:

Adits and levels.....	\$13085.26
Surface work.....	2279.23
Machinery.....	1673.48
Houses.....	23976.14
<hr/>	
Total.....	\$41014.11



On the Lorway areas, which are situated a short distance to the South West of the Reserve, operations have also been begun and are being pushed forward with much energy. The seam opened underlies the Phelan and has not yet been mined in any locality. Its thickness is 4ft. 1in. Two shafts, 14ft. and 10ft. in diameter, are being sunk, the situation of which is about 1000 yards from the crop of the seam and in the direction of the dip. These shafts are intended for the general requirements of the mine, viz., hoisting, pumping, and ventilation, and will, when completed, enable a large extent of Coal to be opened. An opening is also being made by slope from the crop by which it is intended to win out working plans and carry on regular operations until the completion of the shaft, &c. This mine is very advantageously situated as regards the Glasgow and Cape Breton Railway, with which it is intended to connect it by a short branch. In connection with these operations, eight double houses, a manager's house, stable, and Smith's shop have been erected. The expenditure is stated to be as follows:

Shafts, Adits and levels.....	\$ 5964.69
Surface work.....	3472.51
Machinery.....	1480.00
Houses.....	11500.00
<b>Total.....</b>	<b>\$22417.20</b>

In one other locality in this County, preparations are being made by Messrs P. Ross & Co., for commencing operations in the sea areas held by them near Cranberry Head, and which are situated about half a mile from the shore. An expenditure is returned of \$1004.61.

## **GOLD MINES.**

---

The operations in the Gold mines have, during the year, been conducted in the usual localities with more or less vigor according as circumstances have dictated. In some the production have remained very steady and in others it has been reduced. At the

### **OVENS,**

and other localities generally associated with that district, no mining of any moment has been carried on. Prospecting in a few places has, however, been continued.

### **RENFREW.**

Mining in this district has been but to a small extent in comparison with former years. The principal operations have been carried on by the Ophir and the Hartford Companies on the lodes worked last year. They have been conducted in the usual manner and present no new or noticeable features.

### **OLDHAM.**

The principal mining in this locality has been on the Symonds lode by the St. Andrew's Company. The operations were, for the greater part of the year, steadily carried on, but they have recently been suspended and the mine is now abandoned. The Barrel lode has also been worked, and Mr. Donaldson has continued to mine the lode opened by him last year. Operations have recently been begun by Mr. Shaffer, on the lode formerly worked by the Britannia Company.

### **WAVERLY.**

The operations in this district, though still circumscribed in comparison with former years, have been continued by Messrs. DeWolf and others. The Union lode has until

within the last three months been regularly mined by DeWolf & Co., in the usual manner. At present operations are suspended and mining has been resumed on the Brodie lode north of the Tudor. The American Hill Company's operations have been confined to the North Taylor lode.

### MONTAGU.

The only mining of any moment in this district has been, as was the case last year, by the Messrs. Lawson and the Montagu Company. By the former it has been steadily pursued and carried on with much regularity. The main shaft on the Belt lode is now 240 feet deep, the east one 124 feet, and the west one 190 feet. The extent of ground stoped underhand between these shafts is 422 feet. Explorations have also been continued during the year; about 400 feet of ground to the south of the Belt lode having been cut and tunneled through. In connection with the work a ten stamp crusher is in course of erection.

The Montagu Company's operations have been chiefly on the St. Patrick lode, those on the Belt lode have been entirely suspended.

### TANGIER.

Some unsteadiness has prevailed in this locality, the operations of the Burlington Company having been suspended at the commencement of the year, and only resumed a few months ago. The mining has been on the stopes formerly worked. The Leary and South Lake lodes have also been connected by a cross tunnel. Some explorations have been made by the same Company on the North lode.

By the Strawberry Hill Company operations have been carried on with regularity on the Forrest and Dunbrack lodes, as hitherto. The works have been generally extended and are in the usual form; presenting nothing requiring special remark.

At Mooseland the Humber Company have continued their

operations on the Irving lode; the eastern extremity of the property having been chiefly worked. The depth of the shafts is now 60 feet. A tunnel has also been driven eastward 125 feet from which underhand stoping is regularly carried on. A shaft has also been sunk 15 feet on the western portion of the belt, and a tunnel driven 20 feet.

### SHERBROOKE.

The mines in this district have been worked with more or less regularity during the year, according as the operations have been attended with satisfactory results or otherwise. On the Cumminger and Dewar lodes, mining has been steadily pursued by the Wellington Company. The main shaft on the Cumminger lode is now 480 feet deep. At this depth a tunnel has been driven 200 feet to the west and the lode stoped to the old workings. On the Dewar lode the main shaft has been sunk 70 feet farther; its depth being now 170 feet, to which depth the lode has been stoped over a length of about 200 feet.

The operations of the New York and Sherbrook Company have been on the McDaniel, the North, the Harrison, and the Sutherland lodes. On the first of these, after exploring eastward by tunnel and continuing the shafts without finding an improvement in the lode, operations have been entirely suspended. On the North lode, the depth of the main shaft is now 200 feet, and the operations, which are of the ordinary character, are steadily carried on. The shaft on the Harrison lode has been sunk to a depth of 210 feet, and the west tunnel, out of west shaft, is now 120 feet in length. On both these last named lodes the hoisting and pumping is done by steam power. Mining was continued a short time on the Sutherland lode, the shaft having been sunk to a depth of 120 feet. At present, however, all work is suspended.

By the Palmerston Company mining has been carried on with their usual energy on the lodes worked last year. On



the Palmerston lode the west shaft is now 120 feet deep; to which depth the stoping has been carried underhand through to the west shaft. Eastward from the east shaft 100 feet, the lode has been stoped 30 feet to the end of the tunnel. Thirty feet from the east shaft and on the east side thereof, a tunnel has been driven to the south 26 feet, which cut a belt of lodes. On this belt tunnels have been driven east and west 25 feet, and the lode has been stoped overhead to the height of 15 feet, that length, on each side of the tunnel.

In the west shaft on the same lode a tunnel has been driven west at the depth of 90 feet, for which length the lode has been stoped to a height of 35 feet.

On the eastern portion of their property the Company have sunk a shaft 80 feet on the Stryker lode, and driven tunnels east and west; the east one being 16 feet in length and the west one 30 feet, to which length and to a height of 50 feet the lode has been stoped. North of the Stryker lode 100 feet, two shafts have also been begun on the Snow lode.

The Dominion Company have also continued their operations on the Palmerston lode; the depth of the main shaft being now 140 feet. The stoping has been carried on in the usual manner. Operations are however at present suspended.

The operations of the Caledonia Company on the Ferguson lode have been discontinued, and mining is now carried on by that company on the Caledonia or Wilson lode, about 30 feet north of the Ferguson lode. On this lode a shaft has been sunk 50 feet, and a tunnel driven in a slanting direction to the surface, the length of which is 200 feet.

Mining has recently been resumed by the Meridian Company on the Stryker lode, in which their former operations were carried on.

Two shafts have been sunk, the distance between them being 83 feet. The west shaft is now 120 feet deep, from

which depth a tunnel has been driven westward 73 feet. The depth of the east shaft is 115 feet. At 50 feet in this shaft a tunnel was driven to the west shaft and the lode has been stoped to surface above the tunnel. A shaft has also been sunk about 56 feet to the north of the Stryker lode and a cross-cut driven to connect it therewith.

The Hamilton Company have continued their operations on the Ferguson lode. A tunnel has been driven from the west shaft 40 feet to the east, and the lode is now being stoped overhead. From the east shaft the tunnel has been extended eastward 55 feet, being now 115 feet in length, for which distance the lode has been stoped underhand to a depth of 40 feet. On west side of same shaft the lode is stoped to the same depth and 60 feet in length. An opening has been made by this company on the Caledonia or Wilson lode, an open cut having been made 160 feet in length and 32 feet deep.

The cross-cut that was being driven from the west shaft on the Ferguson lode has been continued and is now 120 feet to the north of that shaft. Prospecting on other lodes has been carried on during the year by various parties. On one lode, north the of Wellington, an opening has been made by Mr. James McDonald, 150 feet in length and 23 feet deep. The New York and Sherbrooke Company have begun to open a lode supposed to be the Dewar. This class of work is for the present, however, suspended.

At Cochran Hill the little that has been done has been of a prospecting character.

## WINE HARBOUR.

In this district the principal operations have been by the Eldorado and Phoenix Companies. Mining has been confined by the former Company to the belt of lodes hitherto worked. A new shaft has been sunk, and steam hoisting and pumping machinery has been substituted for horse power. The Phoenix, late Eureka, Company's operations have been on the same lode that was worked by that Com-





pany. An additional shaft has been sunk on it to the depth of the old workings ; and at a distance of 100 feet to the eastward, another has recently been begun.

### STORMONT.

The only mining of any moment in this district has been by the United Mining Association of London and the Consolidated Mining Company, nothing having been done by the Mulgrave Company. The operations of both companies are on the belt of lodes worked last year by the former Company. About eight feet only on the north side of the belt is now worked by that Company. Two shafts have been sunk 20 feet, and tunnels are being driven between them. The Consolidated Company have also sunk two shafts 15 feet and begun tunnels from them.

At Country Harbour very little has been done during the year. In both localities prospecting has, however, been continued.

### LAWRENCETOWN.

In this district mining has been nearly altogether suspended during the whole of the year.

### MOUNT UNIACKE.

By none of the Companies in this district has mining been carried on to an extent exceeding the very limited operations of last year. The Uniacke, the Westlake, the Montreal, the Queen, and a few other properties, have been partially worked, but in each case, on but a small scale.

### GAY'S RIVER.

The operations in this locality do not differ much from those of former years. Although still not worked to any extent, the results continue to be encouraging.

## CARIBOU.

In this locality the operations have been prosecuted with steadiness and are being extended. Mr. Touquoy has opened two shafts on a lode, the thickness of which is ten inches. These shafts are 50 feet apart and 18 and 33 feet deep; the lode has been stoped between them. On the same lode an open cutting has been made to the west 100 feet in length and about ten feet deep. A similar extent of work has been done on the North lode, the thickness of which is 8 inches; and the South or flat lode has also been stoped by open cut 100 feet in length and over 20 feet in depth.

On the free claim Messrs. Jennings and Wilson have sunk two shafts 34 and 35 feet deep respectively, and 60 feet apart; and have stoped the lode between them to that depth. An open cutting has also been made to the west on the same lode 108 feet in length and 4 feet deep; and one to the east 30 feet in length and 8 feet deep.

The Taylor lode, 4 inches thick, has been opened in a similar manner, 225 feet in length and 8 feet deep. Operations on the Bushing areas were discontinued for about seven months, but the discovery of some good boulders in August last induced a search for a lode, which was, after much labor discovered. This lode, the thickness of which varies from 5 to 10 inches is nearly horizontal in position, being on the crown of an anticlinal. A considerable amount of work has been done in open cuttings for drainage and exploring; three shafts have been sunk 13 feet deep and the lode has been removed over a space 70 feet by 35 feet.

Another shaft has recently been begun in which pumping gear is to be placed in connection with the Engine that works the Mill.

On the Richey lode a shaft was sunk 20 feet, but operations are at present suspended on account of the quantity of water and other impediments. At the Hyde mine nothing has been done during the year.

Mining has been continued in other localities, but with



the exception of these at Yarmouth and Beaver Dam, the operations are still only of a prospecting character. At Yarmouth they have been carried on pretty steadily and in the usual manner on the lode worked last year. At Beaver Dam a shaft has been sunk on a belt of lodes, the thickness of the lodes varying from 2 feet to 3 inches. Another belt south of this containing 4 lodes averaging 12 inches in thickness has also been opened; and a 15 Stamp Mill and other buildings have been erected.

### ACCIDENTS.

The accidents in the past year are twelve in number. Of these five have resulted fatally. Two persons have been hurt by machinery, four by falls of stone or coal, two by premature blasts, one by being run over by waggon, one by explosion of gas, one by falling from a bridge, and one was suffocated by gas. The following statement gives the names of the sufferers, the locality in which the accidents happened, and the result thereof:

No.	Date.	Name.	Name of Mine.	Cause.	Result.
	1871.				
1	Feb. 27 . . .	J. McDonald . . .	Montagu . . .	Hurt by machinery . .	Recovered
2	March 3 . .	Geo. White, } Alex. Weir, }	Victoria . . .	Fall of stone . . . . .	Died.
3	March 9 . .	J. McKinnon . . .	Sydney . . . .	Fall of coal . . . . .	Recovered
4	March 23 . .	A. McDonald . . .	Montagu . . .	Hurt by machinery . .	Died
5	April 18 . .	K. McMullen . . .	Sydney . . . .	Explosion of powder . .	Recovered
6	June 5 . . .	Jno. Green . . . .	Sydney . . . .	Fall off bridge . . . .	Died
7	July 18 . . .	— Steele . . . . .	Sydney . . . .	Run over by waggon . .	Recovered
8	August 10 . .	J. Sutherland . . .	Nova Scotia . .	Fall of coal . . . . .	Recovered
9	August 15 . .	A. Williams . . . .	Albion mines . .	Suffocated . . . . .	Died
10	August 21 . .	C. McKay . . . . .	Caledonia . . .	Explosion of gas . . . .	Recovered
11	August 24 . .	N. McDougall . . .	Sydney . . . .	Fall of coal . . . . .	Recovered
12	Sep. 15 . . .	M. Borden . . . . .	Caledonia . . .	Explosion of powder . .	Recovered

No. 1. This accident occurred to Joseph McDonald in a singular manner. He was lowering an empty tub at one of the shafts at the Albion mine, Montagu; and supposing that the tub had reached the bottom, he let go the jack roll, which, owing to the weight of the tub and rope, revolved so

rapidly that he was struck on the chest by it and rendered insensible for a while.

No. 2. George White, Alexander Weir, and other three men were employed in the Victoria mine, and were engaged in the bottom of the slope which was being driven to the dip. A large stone, which is supposed to have come from the dip of the slope, was suddenly loosened and the angle of the dip of the seam being very steep, it rolled with great rapidity down the slope. One of the men heard it coming and warned his companions, two of whom escaped with him by passing to the west side of the slope. White and Weir unfortunately kept to the east side, down which the stone was rolling, and both were struck by it. White was killed on the spot; Weir luckily escaped without serious injury. An examination of the slope was made, but how the stone became detached or where it came from was not discovered.

No. 3. The death of McKinnon was caused by a mass of Coal falling upon him when at work in the Queen Pit, Sydney mines. He had undermined the Coal and prepared it for bringing down by wedges which he had driven as far as he could into the Coal. It did not fall, however, and he left it to get his breakfast. On returning he incautiously began to extend the cutting made in the Coal without again trying the wedges, and whilst so employed, the mass fell upon him and inflicted injuries which caused his death.

No. 4. This accident was of a similar character to that which occurred at the same mine to Joseph McDonald on the 27th February. Angus McDonald was lowering Mr. Bell, the carpenter at the mine, down one of the shafts, when the handle of the jack roll, either by carelessness or owing to his inability to hold it, slipped from his grasp and in attempting to regain it he was struck on the arm, which was broken in two places. Mr. Bell, although he was precipitated about 40 feet, singularly escaped without injury.

No. 5. This accident occurred at the Sydney Mines,

and is a strong instance of the carelessness with which miners will occasionally go about their work. McMullen was one of three who were preparing to take down a mass of coal by blasting. They had commenced at a corner of a pillar of coal which was being removed in the ordinary manner; and he and another were engaged undermining, whilst the other man was preparing the hole for firing, on the other side of the corner. In doing this he struck the needle against a stone at the end of the hole, and ignited the powder and brought down the block of coal upon McMullen, who was crushed to death. His companion fortunately escaped.

It appeared, on examining the roof of the seam, that the hole had penetrated a short distance into the roof, and it is therefore strange that this was not discovered and more care taken in driving the needle. It was also very imprudent to undertake an operation requiring great care when the others were partially under the coal.

No. 6. Green was employed at the Sydney Mines Shipping Wharf. He was standing near the edge of a bridge to which some repairs were being made, when he fell backward into the road below, about ten feet, and was so injured that he did not recover.

No. 7. This accident also occurred at the Sydney Mines. Steel was one of the trimmers employed at the shipping wharf. Whilst lying on the wharf resting, he incautiously put his leg across one of the rails of the track. A loaded wagon was being pushed by two men towards a vessel, and one of the wheels passed over his leg.

No. 8. This accident occurred to Sutherland whilst loading the tubs in the Nova Scotia Mine. The coal is run down shoots into the tubs, and some of the pieces in falling struck him on the head and neck.

No. 9. McGilderic lost his life by going into an unworked place in the Foord pit, Albion Mines, in which there was gas. The place had been driven to the

rise for the purpose of ventilation, but was not holed, working having been suspended with the intention of holing it from the upperside.

It is not known what object McGilderic had in going into the place, as he had no necessity to go near it, but he appears to have been attempting to go to the face when he was struck down by the gas and suffocated.

No. 10. In this instance, McKay, who was a coal cutter in the Caledonia Colliery, was passing over a fall of stone above which some gas had accumulated; and having naked light he was severely burnt about the face and arms. The gas was known to be there, and he had been cautioned about it.

No. 11. This accident occurred at the Queen Pit Sydney Mines. McDougal and his partner had fired a shot which had not, however, brought the whole of the coal down, and whilst filling the loosened portion into a tub, part of the mass that remained, fell upon McDougall and severely injured him.

I have the honor to be,

Your obedient servant,

**JNO. RUTHERFORD,**

*Inspector of Mines.*

**THE HON'BLE W. GARVIE,**

**Commissioner of Public Works and Mines.**















## JUNE, 1871.

Stormont.....	3	23	3	2	1	245	206	09 02	4 05 12	93	02 13
Wine Harbour.....	2	32	5	4	1	363	363	07 10	15 10	135	09
Sherbrooke.....	15	165	12	9	3	1191	1191	08 09	5 17 10	504	15 16
Tangier.....	4	69	4	3	1	321	321	14	1 05 04	224	09 11
Montagu.....	3	53	2	2	...	65	65	4 16 08	11 13 08	313	03
Waverly.....	2	58	4	3	1	252	252	12 06	16 16	154	15
Oldham .....	12	46	3	1	2	79 13	79 13	2 04 10	23 10 20	174	03
Renfrew.....	6	35	5	2	3	177	177	08 13	16 18	75	14 16
Uniacke.....	6	21	6	5	1	99	106	09 16	14 01	51	04 05
Caribou.....	2	6	2	1	1	.....	.....	.....	.....	.....	.....
Unproclaimed, &c.....	2	21	9	5	4	7	7	13 17	13 17	13	18 19
Total.....	57	529	55	37	18	2799	2767	12 13	23 10 20	1740	15 08



# AUGUST.

Stormont.....	5	16	3	1	2	300	...	277	15	...	04	21	1	16	06	...	67	14	17
Wine Harbour.....	3	44	5	4	1	335	...	335	...	...	11	03	5	17	21	...	186	06	18
Sherbrooke.....	18	159	12	9	3	883	5	883	5	...	12	08	6	09	...	...	543	15	10
Tangier.....	5	97	4	3	1	226	...	158	10	...	19	08	2	3	06	...	153	13	...
Montagu.....	4	49	2	2	...	79	...	79	...	...	2	16	17	12	...	...	224	02	04
Waverley.....	5	47	4	8	1	224	10	227	10	...	10	11	...	14	02	...	119	02	...
Oldham.....	10	50	3	1	2	81	15	81	15	...	1	19	...	7	16	...	159	13	22
Renfrew.....	7	34	5	2	3	...	...	287	...	...	6	...	...	11	18	...	85	17	06
Uniacke.....	2	10	6	5	1	9	05	50	10	...	17	10	2	11	06	...	43	14	18
Caribou.....	4	11	2	1	1	59	...	19	...	...	16	07	...	16	07	...	15	10	...
Unproclaimed & other Dist's.	2	12	9	5	4	49	10	49	10	...	04	11	...	11	10	...	10	19	...
Totals.....	65	529	55	36	19	2247	05	2448	15	...	13	03	12	...	...	...	1610	08	23





## OCTOBER.

Stormont.....	3	22	3	1	2	320	...	248	...	7	14	...	13	13	...	94	04	07
W-ne Harbour.....	4	48	5	4	1	434	...	434	...	5	15	...	4	16	12	120	10	17
Sherbrooke.....	16	154	12	9	3	837	10	837	10	10	20	6	14	20	...	455	15	10
Tangier.....	6	91	4	3	1	249	...	249	...	14	19	1	07	04	...	184	...	...
Montagu.....	3	50	2	2	...	114	...	82	...	3	10	13	11	08	...	252	09	...
Waverley.....	3	56	4	3	1	242	...	242	...	10	23	...	12	...	...	132	14	...
Oldham .....	12	54	3	1	2	168	...	168	...	17	...	4	10	14	...	142	18	07
Renfrew.....	6	34	5	2	3	...	...	238	10	...	5	16	1	1	16	67	16	21
Uniacke.....	2	1	6	5	1	14	...	14	...	...	5	11	...	16	...	3	16	12
Caribou.....	2	16	2	1	1	13	...	126	10	...	1	09	17	1	13	188	01	...
Unproclaimed, &c.....	1	3	9	5	4	18	...	18	...	...	...	...	...	...	...	1	04	...
Totals.....	58	529	55	36	19	2409	10	2657	10	...	12	8	11	08	...	1643	10	02



## DECEMBER.

Stormont.....	3	31	3	1	2	210	...	15015	...	712	...	1518	...	...	...	59	01	03
Wine Harbor.....	3	46	5	4	1	350	...	350	...	611	...	1010	...	...	...	113	8	...
Sherbrooke.....	12	135	12	9	3	666	10	666	10	...	1110	146	10	...	...	380	08	18
Tangier.....	6	104	4	3	1	211	...	211	...	1304	...	1602	...	...	...	139	06	12
Montagu.....	3	47	2	2	...	7805	...	4105	...	50703	1108	...	...	...	...	220	19	...
Waverley.....	3	57	4	3	1	226	...	226	...	1017	...	1821	...	...	...	121	02	08
Oldham.....	12	36	3	1	2	12404	...	12404	...	1406	21506	...	...	...	...	91	05	09
Renfrew.....	4	27	5	2	3	70	...	...	...	...	...	...	...	...	...	...	...	...
Uniacke.....	1	14	4	3	1	205	...	205	...	0213	...	0213	...	...	...	26	01	...
Coribou.....	2	17	2	1	1	62	...	80	...	1	21	10308	2	10	...	83	10	...
Unproclaimed & other Dist's.	1	3	9	5	4	18	...	18	...	...	...	...	...	...	...	2	11	...
Totals.....	50	517	53	34	19	2220	19	2072	14	11	22	1108	...	...	...	1237	13	02



**No. 1.**

*Statement showing the number of Men Employed, Quartz crushed and Gold obtained each Month in each District.*

RECEIVED

STATE OF CALIFORNIA  
COUNTY OF SAN FRANCISCO  
RECEIVED  
JAN 1 1880





**No. 3.**

*Statement showing the number of Men Employed, Quartz crushed, and Gold obtained each Month in each District.*





## DECEMBER.

Stormont.....	3	31	3	1	2	210	15015	712	1518	59	01	03
Wine Harbor.....	3	46	5	4	1	350	350	611	1010	113	8	8
Sherbrooke.....	12	135	12	9	3	66610	66610	1110	14610	380	08	18
Tangier.....	6	104	4	3	1	211	211	1304	1602	139	06	12
Montagu.....	3	47	2	2	...	7805	4105	50703	1108	220	19	...
Waverley.....	3	57	4	3	1	226	226	1017	1821	121	02	08
Oldham.....	12	36	3	1	2	12404	12404	1406	21506	91	05	09
Renfrew.....	4	27	5	2	3	70	...	...	...	...	...	...
Uniacke.....	1	14	4	3	1	205	205	0213	0213	26	01	...
Coribou.....	2	17	2	1	1	62	80	1	10308	83	10	...
Unproclaimed & other Dist's.	1	3	9	5	4	18	18	...	...	2	11	...
Totals.....	50	517	5334	19	2220	19	207214	1122	1108	1237	13	02



U O L D .  
*Mines Department for 6 months ended 30th June, 1871.*

DISTRICTS.	RECEIPTS.					EXPENDITURE.				
	Rents.	Royalty.	Sites.	Totals.	Salaries, Surveys &c	Return of Rents.	Return of Royalty.	Royalty Commission	Leads	Totals.
Oldham	\$30 00	\$590 02	7 50	557 52	297 50	2 00	-	45 12	-	344 02
Renfrew	220 00	437 25	-	657 25	96 00	-	-	22 09	-	118 09
Tangier	88 00	371 65	-	459 65	180 50	-	-	4 75	-	191 25
Stormont	283 50	47 02	-	330 52	180 88	54 00	-	8 40	-	243 38
Wine Harbor	192 00	480 68	-	672 68	233 50	-	-	25 84	-	259 34
Sherbrooke	162 00	2168 50	-	2320 50	380 57	-	-	106 85	-	467 42
Montagu	2 00	652 00	1 00	655 00	15 00	-	-	-	-	16 00
Uniacke	416 00	44 00	-	460 00	603 00	-	-	-	-	603 00
Gay's River	8 00	55 53	-	63 53	-	-	-	-	-	-
Carlton	14 00	79 21	-	93 21	-	-	-	-	-	-
Waverly	8 00	68 94	10 00	81 94	-	-	23 37	8 19	-	26 56
Ovens	94 00	-	-	94 00	-	-	-	-	-	-
Wagamatkook	172 00	-	-	172 00	-	-	-	-	-	-
Unproclaimed	148 00	-	-	148 00	15 00	-	-	-	-	15 00
Prospecting Licenses	-	-	-	940 16	-	-	-	-	Ret'm	11 25
	\$1767 50	4919 75	18 50	7645 91	1988 00	56 00	23 37	216 24	-	2294 86

Supplementary account of Expenses common to both branches of the Department:—

Stationery and Printing	\$716 02
General Expenses	3418 23
Expenses Gold	\$4134 24
“ Coal	2294 86
	\$6439 10

Unproclaimed . . . . .	116 80	3 00	- -	119 80	21 00	30 00	- - -	- - -	- - -	51 00
Prospecting Licences . . . . .	- - -	- - -	- -	603 38	- - -	- - -	- - -	- - -	Ret'm	3 43
	\$1631 93	4943 25	- -	7178 56	1277 03	47 52	90	277 80	10 00	1616 03

Supplementary account of Expenses common to both branches of the Department:—

	\$ 410 27
	2868 07
	<u>\$3208 34</u>
Expenses, Gold	1616 03
“ Coal	105 49
	<u>\$5080 51 C. Cy.—\$5219 70 N.S. Cy.</u>

## OTHER THAN GOLD.

Mines Department for Six Months ended June 30th, 1871.

COUNTIES.	RECEIPTS.				EXPENDITURE.			
	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Return Li- censes to Search.	Return Li- censes to Work.	Surveys.	Totals.
Antigonish .....	\$40 00	.....	.....	40 00	.....	.....	.....	.....
Amberland .....	920 00	.....	657 70	1577 70	.....	.....	.....	.....
Le Breton .....	400 00	100 00	196 48	696 48	.....	.....	.....	.....
Antigonish .....	180 00	.....	113 62	293 62	.....	.....	.....	.....
Antigonish .....	40 00	50 00	.....	90 00	.....	.....	.....	.....
Antigonish .....	40 00	.....	.....	40 00	.....	.....	.....	.....
Antigonish .....	80 00	.....	.....	80 00	.....	.....	.....	.....
Antigonish .....	60 00	50 00	.....	110 00	.....	.....	.....	.....
Antigonish .....	20 00	.....	.....	20 00	.....	.....	.....	.....
	\$1780 00	200 00	316 68	2296 68	.....	.....	.....	.....





*Receipts and Expenditure for Six Months ended December 31, 1871.*

60



# STATEMENT

*Receipts and Expenditures for Twelve Months ended December 31,*

(NOVA SCOTIA CURRENCY.)

RECEIPTS.	EXPENDITURE.
Rents (Gold).....\$3444 14	Salaries and Surveys, (Gold) .....\$3300 02
Royalty " ..... 9998 44	Return Rents " ..... 104 83
Mill Sites " ..... 18 50	Return Royalty " ..... 24 29
Prospecting Licenses do..... 1560 07	Royalty Commission " ..... 501 65
Licenses to Search (Coal)..... 4500 27	Lands " ..... 10 28
Licenses to Work " ..... 1075 73	Return Prospecting Licenses, do..... 14 78
Royalty " .....46289 20	Return Licenses to Work (Coal)..... 50 00
	Return Licenses to Search " ..... 120 00
	Stationery and Printing ..... 1137 53
	General Expenses..... 6385 42
<u>\$66886 35</u>	<u>\$11648 80</u>



**PROVINCIAL MUSEUM.**







**PROVINCIAL MUSEUM.**





1

1

1

1



# REPORT

## ON THE

### **Provincial Museum.**

---

TO THE HON'BLE WM. GARVIE,

Chief Commissioner of Mines and Works :

SIR,

In submitting a Report on the Provincial Museum, it may be necessary to give some account of its origin. In the beginning of the year 1866 I proposed to the late Andrew McKinlay, Esq., Trustee of the Mechanics' Institute of Halifax, to take the Museum of that Institution, and to make it the beginning of a Provincial Museum:

The Mechanic's Institute had become extinct, and the Museum was becoming a ruin. There were still surviving some valuable collections and many interesting specimens. Mr. McKinlay and the other trustee, James Forman, Esq., agreed to my proposal.

I also applied to the Provincial Government for accommodation in the New Provincial Building which was in the course of erection, and it was arranged and agreed to set apart for the Provincial Museum the spacious room which it now occupies. The Provincial Museum being now considered a fact, the Nova Scotia Commission for the Paris Exhibition of 1867,—of which I was the Secretary—purchased Natural History Collections, with the understanding that they were to be brought back from Paris and deposited in the Museum. The collections were: Professor How's complete collection of Nova Scotia Minerals, and his Nova Scotia Herbarium; Downs' collection of Nova Scotia

Birds, and Barne's collection of Carboniferous Fossils from Nova Scotia and Cape Breton.

When I returned from Paris, I found some difficulties had arisen which threatened the success of our project. At length, in October, 1868, I was authorized by the Government to take possession of the Museum Room. I received permission from Mr. Forman, the only surviving Trustee of the Mechanic's Institute, to remove the articles belonging to the Museum, and to deposit them in the room provided in the new Provincial Building. The Provincial Museum was then established.

Our Museum was designed to be a Permanent Exhibition of the Industrial Resources of the Province, combined with a Museum of Science and Art. How far this design has, up to the present, been accomplished, I shall proceed briefly to demonstrate.

Before entering the Museum Room, we come to a fine collection of Building Stones, Granite and Sandstones, with fine specimens of Limestones and Gypsums from various localities in Nova Scotia and Cape Breton. There is also an illustration of Brick manufacture from Lang's establishment at Shubenacadie. Besides these, there are large blocks of coal from the Albion and Acadian Mines. This is only a part of our representation of the Pictou Coal Fields. We were obliged, from want of accommodation, to erect the greater part of the Albion Mines' two coal columns, in the Province Building. This is only a beginning of the Nova Scotia (proper) Coal collection. Before us is a block of coal from Cow Bay, Cape Breton,—Block House Mines. This is the first of the Cape Breton collection. The Albion Mines are illustrated by a section of each of the shafts, by J. Hudson, Esq., C.E., the Superintendent, and the Cape Breton part is illustrated by a section of the shaft, by H. Poole, Esq., Superintendent of the Caledonia Mine. This was prepared for the Paris Exhibition. On either side of the collection of blocks of coal are the following interesting specimens: A Fossil Tree—*Sigillaria reni-*

*formis*—from the Albion Mines; blocks of Basalt from the Giant's Causeway, Ireland; massive Stalactites, from Gibraltar, and a Tree Stump, *Sigillaria*, from Lesmahagow, Scotland. On the walls are views of Halifax as it was nearly a century ago, and photographs of Dartmouth and the New Provincial Building by way of contrast.

On entering the room we are confronted by a continuation of the economic mineral department, by the gilded obelisk exhibited at Paris, representing the quantity of gold extracted from the mines of Nova Scotia from January, 1862, to September, 1866. This stands on a cube representing the quantity of gold extracted from Sept., 1866, to Sept., 1868. Under this is another block representing the quantity extracted from Sept., 1868, to January 1871.

The whole represents a weight of 5 tons, 8 cwt., 2 qrs., 2 lbs. A value of \$3,373,431.

The quantity given is according to the official returns.

On the steps leading to the obelisk are arranged massive specimens of *Limonite* (Iron Ore) from the Iron deposits of East River, Pictou County, Brookfield and Londonderry Mines, Colchester County; Sulphur Ore, *Sulphuret of Iron*, from Shubenacadie; Serpentine from Antigonish County; Anhydrite (gypsum) from Windsor; Marbles from Cape Breton; Limestone from Springville, Pictou Co.; Sandstones from Pictou and Hants Counties. In the Cases around the base of the obelisk is a fine collection of auriferous quartz specimens from Waverley, Mount Uniacke, Renfrew, Isaac's Harbour, Wine Harbour, Montague, the Ovens and Gay's River. The greater part of this collection, was exhibited in Paris. The International Jury awarded it a silver medal on account of its scientific value. In a case opposite is a continuation of the same department. In this we have Copper Ores from the Counties of Pictou and Antigonish. *Pyrolusite* and *Manganite Binoxide of Manganese* and *Hydrous Sesquioxide of Manganese*. Iron Ores from Nictau; Hematite and Micaceous specular Iron

Ore from Polson's Lake, Antigonishe County; Spathic Iron Ore, *Carbonate of Iron*, from Sutherland's River, Pictou County; Limonite, *Brown Hematite*, from East River, Pictou Co., and from Brookfield, Colchester County. There is here also an interesting illustration from the Londonderry Iron Mines—the first bar of iron made at the mines—the collection sent to the Paris Exhibition by E. Jones, Esq., Manager of the Mines, consisting of Ores, Steel Iron, Puddled Steel, Cast Steel, Axe and Chisel. The steel of the collection was made with coke from the [REDACTED] Coal Mines, Pictou. It was part of the first steel made at the mines. In the same case is a representation from the works of the Starr Manufacturing Company, Dartmouth. Here are Forbes' Patent Acme Skates, Nails, &c.

In a case near is an interesting collection, not Nova Scotian, containing large specimens of *Albertite* from New Brunswick, Cinnabar, *Sulphuret of Mercury* from Almaden, Spain, Copper Ore, *Sulphuret of Copper and Iron* and Nickel Ore, from Tilt Cove mine, Newfoundland, and *Cryolite, fluoride of Aluminium and Sodium* from Greenland.

In the Department of Scientific Mineralogy there are three collections, 1st., The Mechanics Institute collection, 2nd, The Webster collection, 3rd., Professor How's collection.

The first, the Mechanics' Institute collection, is general, and contains about 1000 specimens, I have arranged these according to Dana's manual of Mineralogy. The classification is as follows:

- Class I. Gases, consisting of, or containing, Nitrogen or Hydrogen.
- Class II. Water.
- Class III. Carbon and Compounds for Carbon.

In this class the collection contains a small diamond, having the form of a crystal, which, according to Professor Tennant, F.G.S., occurs ten times among 1000. The specimen is Brazilian.

X

"Albion."—D. HONEYMAN.

Mineral Coal, 1, with bitumen.

Anthracite.

2, without bitumen.

Pictou Coals.

Cape Breton Coal

Cannel Coal

Oil Coal

Albertite from New Brunswick, and Scotland.

Jet.

White, Green, and Purple.  
 Brucite. *Hydrate of Magnesia.*  
 Wavelite.

Class VI. Earthy Minerals.

1. Silica.

Quartz.

Rock Crystal. Numerous Specimens.  
 Amethyst. do.

Rose Quartz.

Smoky Quartz.

▲vanturine.

2. Chalcedonic Varieties.

Chalcedony.

Chrysoprase.

Carnelian. Red, White, Oriental.

Agate.

Fortification.

Moss Agate.

Onyx.

Flint.

3. Jaspers Varieties, abundant and beautiful.

Opal.

Semiopal.

Cacholong.

Hyalite.

Wood Opal.

Silicious Sinter.

Magnesia.

1. Hydrous Silicates of Magnesia.

Talc—Foliated.

Soapstone.

Chloride.

Serpentine, Precious.

“ Common.

Anhydrous Silicates of Magnesia.

Pyroxene.

Coccolite.

Asbestos.

Augite.

Hornblende.

Tremolite

Chrysolite, Olivine.

Alumina.





Iron.  
 Native Iron. *Meteorite.*  
 Iron Pyrites.  
 Mispickel. *Arsenical Iron Pyrites.*  
 Magnetite, Octahedral Iron Ore.  
 Specular Iron Ore.  
 Micaceous Iron.  
 Red Hematite.  
 Clay Iron Stone.  
 Iron Glance.  
 Limonite. *Brown Iron Ore.*  
 Brown Hematite.  
 Bog Iron Ore.  
 Chromic Iron. *Chromate of Iron.*  
 Spathic Iron. *Carbonate of Iron.*  
 Manganese.  
 Pyrolusite. *Binoxide of Manganese.*  
 Manganite. *A Hydrous sesqui oxide of Man-  
 ganese.*  
 Wad. *Bog manganese.*  
 Copper Nickel. *Arsenical Nickel.*  
 Smaltine. *Tin White Cobalt.*  
 Blende. *Sulphuret of Zinc.*  
 Zincite. *Red Zinc Ore. Red oxide of Zinc.*  
 Cinnabar. *Sulphuret of Mercury.*  
 Native Copper.  
 Copper Pyrites. *Sulphuret of Copper and  
 Iron.*  
 Erubescite. *Variegated Copper Pyrites.*  
 Grey Copper.  
 Ruby Copper Ore.  
 Blue Vitriol. *Sulphate of Copper.*  
 Malachite. *Green Carbonate of Copper.*  
 Azurite. *Blue Carbonate of Copper.*  
 Noble Metals.  
 Native Platinum.  
 Native Gold.  
 Native Silver.  
 Brittle Silver Ore. *Sulphuret of Silver and  
 Antimony.*

The second, or "Webster Collection" contains about 700  
 specimens. These were collected by the late Dr. Webster,  
 M.P.P., who was well known in Nova Scotia and elsewhere

as an enthusiastic naturalist. The collection was presented to the Museum by Mrs. Webster, on the condition that it should be kept distinct and designated as I have indicated. This collection is largely Provincial, and consequently does not include so many varieties of minerals as the first collection. Although its general aspect is Provincial, it still contains many foreign minerals. Some of which are much better specimens than those found in the other collection. This collection is also arranged according to Dana's system. Classes III and IV are represented by many excellent specimens. The collection mainly belongs to Class VI. Earthy Minerals, Silica, Quartz, Vitreous Variety, Rock Crystal, has several beautifully regular Crystals.

Amethyst occurs in great abundance. Two very fine specimens have figured prominently in the collections of Nova Scotian minerals exhibited in London, Dublin and Paris.

Chaledonic varieties are numerous and beautiful; Fortification and Moss agates.

Opal, varieties, Cacholong, Hyalite, (Foreign), and Wood Opal Magnesia, *Hydrous Silicates*, Talc, Soapstone, Chlorite, Serpentine, precious and common (Foreign).

Anhydrous Silicates, Augite,

Hornblende, light varieties, Tremolite, Actinolite, Asbestos, Mountain Leather (Foreign).

are included in the collection. To this is added the best collection to be had of the Borates, also discovered by him in the Gypsums of Windsor.

I have thus given a detailed account of the mineral collections in the museum, for the purpose of showing what we have and what we do not have. The mineralogist can thus easily see that while there are some minerals wanting our combined collection is extensive and valuable, and well adapted for the purpose of instruction in the science of mineralogy, and especially the mineralogy of Nova Scotia.

The next department in the Museum is that of Geology and Palaeontology. Here we have a large collection of rock specimens, principally Provincial, viz: Granites, Syenites, Diorites, Felsites, Porphyries, Dolerites, Traps, Trachytes, Serpentine, Schists, Quartzites, Argillites, Breccias, Conglomerates, Sandstones, Marbles, Limestones, Gypsums. These represent the geological formations of Nova Scotia and several other countries. The geology of Nova Scotia is further illustrated by Dawson's Map of Nova Scotia, by Professor Hind's Maps of the Gold Fields, by Logan and Hartley's Map of the Pictou Coal Field, by a Progress Map of the Geology of Pictou County, on a scale of an inch to the mile. (The Topographical lines are from the map of Pictou County, by Churchill.) By a field map of the precarboniferous formations underlying the Pictou Coal Field, made for the Canadian survey, with sections, by a geological map of Antigonish county, and a geological map of Arisaig, with sections, all by the writer, and by beautiful and accurate views, in water colours, of the Junction of the Upper Silurian and Lower Carboniferous formations on the shore near McAra's Brook, Airsiag, by Kate McDougall, (Mrs. Wilson) and of the carboniferous limestones on the Avon, at Windsor, by Professor Nichols.

General Geology is illustrated by Maps and Sections of the Canadian Survey, by Geological maps, with sections of England, Scotland and Ireland, by a geological model of

the Isle of Wight, and maps of the memoirs of H. M. Survey of Great Britain and Ireland.

In the Palaeontological Section.—The Palaeontology of the Nova Scotia Silurian system is illustrated by my Arisaig collection. In this the fossils or remains of animal existence found in the Silurian Rocks of Arisaig, are arranged Geologically and Zoologically. There are 1st., Fossils of the Medina Sandstone, U. S., age. 2d., of the Lower and Upper Clinton, U. S., age, Middle Silurian. 3rd., F. of the Niagara Limestone, U. S., age. 4th., of the Lower Helderberg, U. S., age, Upper Silurian. Each group is also arranged by beginning with the lower forms of life and ending with the upper, so that the order of formations and life in each beginning from the left of cases, is *ascending* and from the right, *descending*. The Arisaig Rocks are typical of Nova Scotian Geology between the Gold fields and Coal fields, and this collection is *par excellence*. The Arisaig collection. It has been examined by the first Palaeontologists in Europe, and was awarded Medals in London, 1852, Dublin, 1865, and Paris, 1867. The fossils, as far as they have been determined, are named by Hall, Salter, Barrande, Billings and Dawson:

There are also collections of fossils from corresponding formations of East River, McLellans Mountain, Sutherland River, French River, Barney's River, Marshy Hope, and Lochaber. The whole forms a key to the age and succession of the Precarboniferous Rocks of Antigonish, Pictou, and Colchester Counties.

The Palaeontology of the Silurian formations of the Western part of the Province is illustrated by the Geological part of the "Webster Collection." There are abundance of Slates from Beech Hill, King's County, covered with the warty sea-fans, *Dictyonema Websteri*, and fossils corresponding with those of the Upper Silurian of the East. In the same

lection and also in the "Webster Collection" are abundance of fossils from the Lower Carboniferous Limestone from Cape Breton and Nova Scotia, East, Middle and West. From Limestone of the same age in Baddeck, Cape Breton, is a noble fossil, a fish spine. *Ichthyodorulite*, *Gyracanthus magnificus*. This was found by Mr. Kidston and presented to the Museum by the late Mr. Barnes, C.E. The fish to which it belonged must have been of gigantic size. In Barnes' collection there is another unique specimen found in the Coal Measures of Cape Breton. The specimen is a wing of a fly, it must have been a Dragon-fly, measuring 7 inches across the wings. The wing is overlaid partially by a fern, the insect has been named *Hoplophlebium Barnesii*, by Scudder. Barnes's collection, with these exceptions, consists of fossil plants of the Coal formation. This with the addition of the Mechanics Museum collection and a few contributions includes *Pinites*, *Sigillaria*, *Stigmara*, (roots of *Sigillaria*) *Calamodendra*, *Lepidodendra*, *Lepidostrobus*, (Fruit) *Calamites*, *Equisetites*, *Asterophyllites*, *Suenophyllum*, *Pinnularia*, *Filices* (Ferns,) *Cordaites*, *Sporangites*, *Antholites*, *Trigonocarpum*, *Hookeri*, &c. I would particularly notice one rare specimen in this collection, a Fern of the genus *Neuropteris* with fronds undeveloped, (in veneration.) In the "Webster Collection" there are also several excellent specimens of Carboniferous plants and also in my own collection. In the last collection there are teeth, spines, and scales of fishes of the same period, teeth of *Diplodus*, *Rhizodus*, and *Holoptychius*. In the "Webster Collection" animal tracks (*ichnites*), and a foot-print of a *Sauropus*, (reptile), from Parsboro' lent by J. M. Jones, Esq., F.L.S. There is also the *Dendroperon Acadianum*, a Joggins reptile, restored by W. B. Waterhouse Hawkins, Esq., F.G.S. The remaining specimens connected with Nova Scotia are the large thigh-bone of the great Mastodon, of the Elephant family, from Middle River, Cape Breton, and a tooth of a small Mastodon. from Baddeck, C. B.

General Paleontology is represented by two collections

the largest, which is arranged in the side cases, begin with the oldest known fossils, if fossil it is, the *Eozoon Canadense*, and ends with fossils of the human period. The fossils are Canadian, Bohemian, English, Nova Scotian, French, and American, and belong to the *Eozoic*, *Palaeozoic*, *Mesozoic* and *Cainozoic* periods, representing the succession of life on the Globe. The other collection is not so extensive. It commences with the primordial, or what has been, until lately, generally considered the earliest period of animal existence and ends with the human period. The fossils in this collection are from America, New Brunswick, Canada, Nova Scotia, England, and Mount Lebanon. The greater part of these have been presented to the Museum by the Rev. P. G. McGregor, Dr. Dawson, Dr. Hattie, Mr. Wesley, Mr. Barnwell, and Capt. Piggie, Mr. Maffet, and Mr. Skelley of the ship Northumbrian.

This part is illustrated by a Geographical and Palaeontological Chart constructed by the writer so as to include the Geology and Palaeontology of Nova Scotia, by a Stratigraphical and Paleontographical Chart, by a number of large figures of fossil-reptiles, *Ichthyosauri* and *Plesiosauri* and a series of Magic Lantern Slides, having pictures of fossils and restorations prepared for the purpose of illustrating the Geological Record of Creation. These slides are painted by Mr. Alfred Tennyson Barret, Artist, Halifax.

The Mineralogical and Geological departments which I have thus sketched form the larger part of the Museum, so that our institution may be regarded as to a large extent a Museum of Practical Geology. This impression, together with the conviction that our Provincial prosperity largely depends on the development of our mineral resources induced me to propose the establishment of a Provincial School of Mines in connection with it, in the same way as the Royal School of Mines is established in connection with the Museum of Practical Geology in Jermyn Street, London. I made the proposal in the columns of the "Morning Chronicle," in which I urged the necessity of such an insti-

tution' for the welfare of our Province. I also adduced the example of other countries having mineral wealth and Schools of Mines. I also described the course of study connected with a proper School of Mines. I showed that Halifax was the best possible seat of a School of this kind, as it was situate in the centre of Gold Mines and metallurgical operations connected with Gold Mining, as it was of easy access by railway to Iron Mines and extensive Iron and Steel Works, and at no great distance from Coal Mines and Works. I also showed that we had eminent professors in our colleges, whose teachings might be made available in the course of study proposed, and that the departments of Mines and Crown Lands might be available for other parts of the same course. In this way I considered that an efficient School of Mines could be equipped at a very moderate expense, and with an incalculable amount of advantage.

I was glad to find that the proposal was well received by the Press, that it was strongly advocated from the Academic chair, and that it was approved by the public.

Considering that a School of Mines would be established at no distant time, I requested and received the sanction of the Chief Commissioner of Mines to inaugurate a class of Geology and Palaeontology as a pioneer to the proposed institution. This class is now in its second session. Last session I had eight students. I have eleven this session. I have not as yet given publicity to this class, otherwise, I believe that respectable as the number now is, it would have been much larger.

It is to be hoped that the Legislature will take some decided action in this matter this session, and establish a Provincial School of Mines.

The next department in the Museum—Botanical—contains an extensive and well arranged collection of Nova Scotian Plants. There is also a neat collection of Nova Scotian Woods, a large collection of paintings of Native Wild Flowers, and interesting and curious collection of



Vegetable productions from foreign countries, and a beautiful collection of *Algae*, marine plants, from the Island of Jersey. In the agricultural section there are a few cereals—grains—specimens of Nova Scotian Hemp and Flax, and the elegantly plaited straw work by Mrs. Begg and Miss Turner exhibited in Dublin and Paris.

Pangolin, *Manus Pentedactylus*.

Armadillo, *Dasypus Unicinatus*, Lin.

Musk Deer.

Here is a skeleton of the Walrus, and of the Porpoise, Elephant's teeth, horns of the Antelope family, antlers of Moose *in the velvet*, and otherwise, antlers of the Carribou in great variety and of noble proportions. All these are of scientific value. This subdivision of the Vertebrates is illustrated by beautiful drawings of Nova Scotian Mammals, executed from the life, by Bernard Gilpin, Esq., M. D. The habits of the Beaver are illustrated by an exquisite model of a Beaver dwelling, modelled from Beaver dwellings at Lake Rossignol. It is accompanied by a beautiful pencil drawing of a Beaver dam, Beaver cuttings, food and bedding. This illustration attracted the attention of Naturalists and others at the Paris Exhibition. It is equally attractive in the Museum. It is the work of Capt. Hardy, R. A.

There is a large collection of birds, the greater part is Native. Downs' Paris collection which received a Silver Medal was the beginning of the Museum Collection. The additions made by T. T. Egan, Taxidermist, are artistic and life like, the taxidermy being of the first class.

The *Raptores* birds of prey are well represented. The Bald Eagle, *Haliaetos Leucocephalus* with quarry is a noble specimen. The collection of Nova Scotia Owls is complete. 1, Great Horned Owl, *Bubo Virginianus*. 2, Long Eared Owl, *Otus Wilsonianus*. 3, Short Eared Owl, *Brachyotus Cassinii*. 4, Saw-whet Owl, *Nyctale Acadica*. 5, Hawk Owl, *Surnia ulula*. 6, Barred Owl, *Syrnium nebulosum*. 7, Sparrow Owl, *Nyctale Richardsonii*, Snow Owl, *Nyctale Nivea*. The *Insessores* or Perchers are numerous, but the collection is somewhat defective. The *Rasores* Scraping birds, include the foreign birds, Pheasants and Peacocks. There are the Newfoundland Ptarmigan *Lagopus Salicatus*, winter and autumn plumage, Quail, and the greater part of the Native birds belonging to this order:



- 14 Smelt, *Osmerus viridescens*.
- 15 Shad, *Alosa prestabilis*.
- 16 Alewife, Gaspereau, *Alosa tyrannus*.
- 17 Tom Cod, *Morrhua pruinosa*.
- 18 Cod, *Morrhua vulgaris*.
- 19 Haddock, *Morrhua aeglefinis*.
- 20 Pollack, *Merlangus Carbonarius*.
- 21 Cusk, *Brosmius vulgaris*.
- 22 Lump Fish, *Lumpus vulgaris*.
- 23 Sharp Nose Sturgeon, *Accipenser oxyrinchus*.
- 24 Eel, *Anguilla vulgaris*.

It includes many rare and curious specimens. There is a great number and variety of Foreign Fishes, wet and dry preparations, e.g., Flying fishes, Dolphins, Sharks, and a small Sawfish. There are several fish skeletons representing different orders. There are formidable swords of *Xiphias gladius*, Sword Fish, &c., Saws of the Saw Fish from 6 inches to 8 feet in length. The largest is the weapon of a monster.

In the sub-kingdom, Articulata, there are Land Crabs and Sea Crabs, Lobsters, *Homarus Americanus*, very small and very large. *Limulus Polyphemus*, Horse-shoe Crab and *Oymothoa triloba* the modern representative of the ancient trilobite found as parasites, on the Cod-fish of our Banks. The *Oymothoas* are prepared wet and dry. There are also Barnacles, Centipedes, Scorpions, Tarantulas, Mason Spiders, Beetles, Locusts, Cicadas, native Moths and Butterflies. There is connected with the *Lepidoptera* a beautiful collection of Cocoons and raw Silks from India and Turkey; of Insect Architecture, there are the nests of the Mason Spiders, *Mygale cementaria* from Palestine, and Georgia, U.S. Hornet's, Wasp's, and Marabunta's nests.

In sub-kingdom 3 *Mollusca*, there is a collection which may be regarded as Typical, every Class and Family is at least represented, from the Cephalopod Argonauta to the *Teredo navalis* ship worm. The specimens are dry and wet. Of the *Cephalopoda*—a gigantic Calamary or Squid pre-

served in alcohol is an unusual specimen. Two valves or shells of the Giant Clam—*MACTRA GIGANTEA*, weighing 87 lbs., attract attention and the illustration of the form and ravages of the ship worm, is interesting and instructive.

In the sub-kingdom 4. *Radiata*. There are Sea Urchins, *Echini*, native and foreign, and *Holothuria*, Sea Cucumber and Star fishes. *Astrophyton*, *Urasters* and *Ophiouras*—native and foreign. There is also a great variety of Corals and *Gorgonia*—Sea Fans. A broken bottle with a brain coral and a branching coral, is a curious specimen.

In the sub-kingdom 5. Protozoa—are native sponges, wet and dry preparations, and two specimens of the beautiful Siliceous skeletons of the *Euplectella speciosa*, Venus's Flower Basket—sponge—from the shores of the Philippine Islands.

I have thus given the classification of the Zoological department of the Museum and pointed out its leading peculiarities. The growth of the department has been somewhat remarkable. About two years ago I was ashamed of its poverty, now, I can speak of its richness. Our fishermen are continually adding to its numbers, and so are captains of our own and foreign vessels. Mr. Egan, our Taxidermist, contributes to it every rare bird that comes into his possession. Since I described the Reptiles, Mr. West has contributed a considerable addition to our tropical—Chelonians, Turtles, Saurians, Alligators, Ophidians, Snakes, and Articulata Centipedes. The student of zoology can have no difficulty in finding illustrations in the Museum. The student of comparative anatomy can find in it skeletons and characteristic parts of the various classes of *vertebrata* and *invertebrata*, and the student of botany can derive a good amount of instruction from the Herbarium and other specimens.

Mr. Barrett has also added illustrations to the Zoological department. He has prepared a beautifully accurate series of Magic Lantern Slides to illustrate the classification of the Zoological Department.

The institute of Natural Science, now holds its meetings in the Museum, and its collections are associated with ours. I have no doubt that this arrangement will advance the interests of the institute and the Museum, and consequently of science in Nova Scotia.

In the Ethnological Department, New Zealand contributes a battle axe, plain and ornamental paddles, Fishing hooks and agricultural implements. The New Hebrides—articles of dress, bow and arrows and an idol. Kingmill—an elegantly mounted stone adze. The Sandwich Islands—clubs and spears. The West India Islands—a model of a Carib's dwelling with appurtenances, a manguera for preparing Cassava starch, a quiver of poisoned arrows, bows and arrows, clubs and an elegant stone tomahawk. Paraguay—hat, bridle, and bolas, for catching wild cattle. Mexico—riding suit, bridle and wooden stirrups. Oregon—mule girth and stirrup. Indian Tribes—Digger Indian Jacket, Indian hunting suit. Crow Indians—moccasins. Delaware Indians—moccasins. Red River—Indian calumet, an elegant stone pipe, moccasins of half-breeds, Indian Chief's hat, Indian hat and collar. Aleutian Islands—plain and ornamental dresses. Greenland—hunting spear, and a beautiful model of a fully equipped Kayak. Mic-Mac—quill and bead work. Japan—a model of the interior of a Temple. China—mandarin hat and boots, lady's boot, shoes, umbrellas, bow and arrows, divining compass, money balance, fishing rod, &c. India—paintings on mica, illustrating Hindoo customs, Burmese writing tablet, rattan, and other curiosities. Africa—Mandingo costume and weapons, and other articles of costume from the west coast. Turkey—an elegant sabre, with Damascus blade, presented by His Honor Sir Hastings Doyle, Lieutenant-Governor of Nova Scotia, and a Turkish Hookah. Russia—a sword from the battle-field of Balaclava. Prussia—a needle-gun from the battle-field of Sadowa.

In the Department of Antiquities. The phosphate bed

tusk of mammoth *Elephas Americanus* and the teeth of the great shark *Carcharodon megalodon*, has contributed a beautifully formed *flint spear-head*, an evidence of man's existence on the spot where these remains of extinct animals are entombed, and giving occasion for the belief, that these animals and man were contemporaries. Indiana and Texas contribute similarly formed spear and arrow heads. In the general and "Webster Collection" there is a great number of stone axes, chisels, gouges, spear heads, arrow heads, pipes, and other stone implements, from Nova Scotia and stone hatchets, from Prince Edward's Island.

It is possible that the hands which formed these spear and arrow heads might have discharged arrows so armed at the tough sides of the Mastadon Giganteus, or they might have been formed at a much later period, although beyond the time of the earliest traditions. Egypt contributes a bronze household God, and Pompeii, some of its remains of Pottery. There are also numerous relics of the French occupation of Louisburg and LaHave.

In the Department of Numismatology—There are ancient Greek and Roman coins, a complete series of casts of Roman coins chronologically arranged. Suits of British and Continental, North and South American, Indian and Colonial, Chinese, Japanese, and Siamese coins. There are Gold, Silver, and Bronze medals, and numerous medallion casts.

In the Fine Arts, we have—Busts of the Queen, Napoleon the First, Homer, Shakespeare, Wilson, Dickens, Watt, Franklin, Lord Clyde and Volta.

Paintings—Sir Humphry Davy, Wollaston, Gilbert Davis, S. G. W. Archibald, McKinlay, and Dr. Grigor. Copies by Valentine or originals.

In Naval Architecture—There are several ship models from the Paris Exhibition, and Local Exhibition of 1868, and Robinson's patent Topsail Clew and Thimbles.

In Mechanics—There is the model of a steam engine, and

Cutlip's model of shear mast and shears formerly used in H. M. Dockyard.

There is also a large collection of Philosophical apparatus belonging to the Mechanic's Institute, and a Library, containing many valuable scientific works.

The collections I have described, fill, I may say crowd, our noble apartment. It would require at least another room, one half the dimensions to afford proper accommodation. Our institution is popular. This is evident from the interest excited and from the readiness manifested by contributors to add to its treasures.

The multitudes that visit the Museum, are from country and town. Our register shows that our visitors are of every class and from every country—many come to be amused, many to be instructed—of the latter, there are inquirers who desire information, which the Museum is intended and fitted to impart—information, in reference to our natural history, or in reference, to the nature and extent of our resources.

The success of the institution is far beyond the most sanguine expectation. It was regarded as an experiment—it is a successful experiment. What has been done teaches what may yet be done. In a few years Nova Scotia may possess a Museum, and Exhibition of her resources without an equal in the Provinces.

I would say, its success is mainly due to the exertions and cordial support of your predecessor, the Hon. Robert Robertson, without these indispensable requisites, the project would have proved a failure.



efforts to illustrate the past history of our Province and its earliest inhabitants—and to illustrate the character of our country, its resources and its present inhabitants, in the Great Exhibitions of 1862, 1865, and 1867.

I have the honor to be,

Your most obedient servant,

D. HONEYMAN.

Provincial Museum, March 4, 1872.

PROVINCIAL  
SCHOOL OF MINES.

---

COURSE OF STUDY PROPOSED

AND

MEANS OF TEACHING.

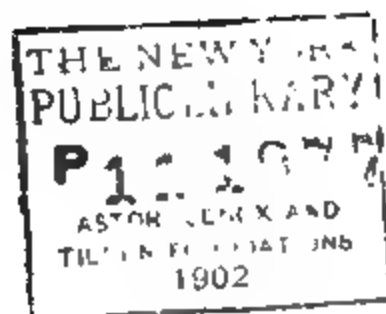
---

Geology and Palaeontology General and  
Specially of N. S.....Pro. Museum.  
Mining, Engineering.....Mines Department.  
Surveying.....Crown Lands Department.  
Chemistry.....Colleges.  
Mineralogy.....Colleges.  
do.....Prov. Museum.  
Metallurgy.....Metallurgist  
Mathematics.....Colleges.  
do.....Academies.  
Natural History.....Colleges.  
do.....Academies.  
Languages, Ancient and Modern.....Colleges  
do do.....Academies  
A Board of Examiners.









# CONTENTS.

	Page.
Report Commissioner of Public Works and Mines . . . . .	iii
Report Inspector of Mines..... . . . .	1
" General Summary . . . . .	3
" Abstract, Coal Sales. . . . .	4
" Coal Mines of Cumberland... . . . .	5
"     "     Pictou . . . . .	7
"     "     Cape Breton . . . . .	12
" Gold Districts..... . . . .	22
Treatment of Tailings . . . . .	24
" Iron Mines..... . . . .	26

1

2

3

4



# REPORT.

---

MINES DEPARTMENT,

}

will become one of the most important mining districts in the Province.

Although the yield of gold per ton of quartz crushed, and the average earning per man employed in gold mining are larger than that of last year, yet there has been a decrease in the aggregate amount of gold obtained, in the number of men employed, and in the number of mines worked this year. This decrease is principally owing to the high price and scarcity of labor, and to other causes mentioned in the Report of the Inspector of Mines, which it is unnecessary here to recapitulate. Gold mining during the past year has been chiefly confined to mines previously opened. A mine was opened at Harrigan Cove, and another at Shear's Point, both in the eastern part of Halifax County. The first mentioned is owned by Mr. Samuel Smith, who has placed a crusher of eight stamps and other appliances on the ground, and is working his mine vigorously. From the appearance of many lodes exposed by a large amount of cross cutting and the returns from the crusher since December, it is expected that it will prove remunerative. The mine at Shear's Point has not been so fully prospected, but some quartz from it crushed at Mr. Smith's mill has yielded a good return. These are the only gold mines opened in new districts during the year.

The same causes that have given an impetus to the coal trade have brought our iron ores into notice. Numerous licenses with the object of searching for iron ore have been issued, and extensive explorations have been made, in some instances successfully.

In licenses to search and work issued by this department, the right is granted to search for, and work all mines and minerals other than gold; in the leases, there is only granted the right to mine for one stated mineral. In some of the areas granted under lease to mine for coal

is found an argillaceous iron ore, which ore the holders of the coal mining lease have no right to mine, and for which right applications have been made by others than the coal mining lessees, if it should be considered advisable to lease such situated iron mines, there will be some legislation required to secure the interests of the present lessees and to prevent collision.

From the circumstances that the above-named ores are

have the necessary surveys made, and had them completed by John Oram, Esq., Professor of Mathematics of King's College. Professor Hind's Report has been printed. A correct map of the locality has been made, showing the required points on which will be marked the areas under lease or license. There is now a difficulty in ascertaining the boundaries of mining areas, in consequence of the courses in all surveys having been given according to the magnetic meridian. True meridian lines have never been set up in this Province. All surveys of Crown Lands and Mining areas have been made by the magnet, and consequently when a corner mark is destroyed or lost, it is almost impossible to find the exact point again. Illustrative of this, Professor Hind states that he found a tree marked as the starting point for the survey of the General Mining Association's area at Spring Hill, but at the corners several different bounds were shown made by different surveyors, who had attempted to run the lines of the area beginning at this tree. As this area has been made the basis for the description of the surrounding ones, this variation of courses may cause difficulty. I would suggest that true meridian base lines be set up, at least, near the principal mining centres, so that surveyors can test the variation of their instruments on making surveys. This should be followed by a survey of the lines of all areas under license to work or lease, as soon as convenient, and the courses taken on the basis of the true meridian. Such a survey is difficult even now, but it will become more difficult to accomplish, the longer it is left undone.

The increased activity in the coal trade created a corresponding demand for labor, which this Province could not supply, and in consequence wages became higher, and ships engaged in exporting coal were unduly detained. Unless a sufficiency of miners be obtained the opportunities now offered for securing permanently the markets lately opened to us, will be greatly lessened.

The usual report of the Inspector of Mines is subjoined, and contains besides the customary information on the general condition of the Gold and Coal Mines, several suggestions by him, deemed worthy of serious consideration, to which I beg to call attention.

Dr. Honeyman continues to make additions to the geological and mineralogical collections in the Provincial



—

**REPORT**  
**ON THE**  
**INSPECTION OF MINES,**

---

The increased demand has come, but not altogether from the quarter expected. Ever since the trade languished, on the abrogation of the reciprocity treaty with the United States, the operators have looked for a reduction of the heavy duty, which was then imposed on all bituminous coal imported into that country, as the means of restoring to them a profitable market for their coal. To some extent their hopes from this source have been realized. The United States' new tariff bill, which came into force August 1st, 1872, declares that the duty shall be :—

“On all bituminous coal and shale, seventy-five cents per ton of twenty-eight bushels, 80 lbs. to the bushel.

“On all slack coal or culm, such as will pass through a half inch screen, forty cents per ton, 80 lbs. to the bushel.”

Yet, the quantity shipped during the year to the United States, has not been as much as might have been expected from a review of the increase that has yearly taken place, notwithstanding the late prohibitory duty.

The unlimited market, which has been so unexpectedly opened to Nova Scotia, is in a great measure due to the state of the trade in Great Britain. While the British exports for the year 1872 have risen from 12,747,989 tons to 13,211,961 tons or by 4 per cent. ; their value has increased from £6,246,133 to £10,443,920 or by more than 66 per cent. This rise in value has permitted our shippers to compete in markets on this continent from which, by low prices, they were hitherto excluded, and it has shewn that the prosperity of our trade is not altogether dependent, as was generally supposed, on the markets of the Republic.

Yet while it is satisfactory to know this, it should not be forgotten, that this country, is as much interested in the total withdrawal of the American import duty, as are the citizens of New England, and that we look to them for our principal market, as much as they naturally do to us, for their supply of bituminous coal.

When speculating on the probable trade of the coming season, it is well to bear in mind, that, with the increased demand in the



Autumn came an increase in the rates of freight ; and the profits that otherwise might reasonably have been expected to accrue to the coal owners, were absorbed in the maintenance of the shipping, that for weeks lay idly waiting their turn at the coal ports. The output from the mines falling far short of the demand, labor consequently was at a premium and wages rose 20 to 25 per cent. above the rates of the year before. In all probability, a further advance will be asked for next summer, when competition bidding for all the available labor prices may be forced to a height that will make mining no more profitable than it has been heretofore.

Wages are now such, at some of the mines, that steady men have earned over \$80 per month for three months in succession ; and all that they can reasonably ask, besides, is to have constant work the whole year through ; the present rate of wages being the maximum that the prosperity of the trade can afford to pay. Anticipations are entertained that the business of next year will double that of the present, but there is really no ground on which such a calculation can be possibly based. The utmost capability of all the mines working under the most favorable circumstances is, I believe, not in excess of 1,100,000 tons ; unless indeed a large importation of skilled labor can be speedily effected.

**GENERAL SUMMARY OF THE RETURNS OF THE MINERAL PRODUCE  
OF NOVA SCOTIA, RECEIVED BY THE DEPARTMENT OF MINES  
FOR 1872.**

Number of Mines.	Minerals.	Quantities.	Value.
25	Coal . . . . . tons	880,950	\$1,409,520
30	Gold (17,173 tons quartz,) oz.	15,079	278,961
2	Iron . . . . . tons	6,000?	
1	Barytes : . . . . . "	260	2080
1	Manganese . . . . . "	40	1400
	Plaster . . . . . "	99,470	89,523
	Fire clay . . . . . "	527	

**COAL Sold in the Province during the year Ended December 31st 1872.**

COUNTY.	ROUND. Tons.	SLACK. Tons.	Nova Scotia Proper.		
			Total Round. Tons.	Total Slack. Tons.	Total. Tons.
Cumberland.....	13,272	881			
Pictou.....	340,142½	48,275½	353,414½	49,156½	402,570½
				Cape Breton.	
Cape Breton.. ..	360,036	20,237½			
Inverness.....	2,879	191	362,915	20,428½	383,343½
	716,329½	69,584½	716,323½	69,584½	785,914



pillar has been abandoned, and a long-wall system with 40 feet faces of work has been introduced. Both divisions of the seam are worked and the intervening parting of fire-clay which there is not so thick as to the westward, is thrown back into the waste. The change in the system of working has been attended by the replacing of the skids hitherto used, by tubs of moderate capacity. On the surface, preparations have also been made for an increased business. The wharf has been extended 100 feet and blocks for 200 feet have been built at right angles with the main wharf which afford additional protection to the shipping. An expenditure is returned as follows:—

Slope.....	\$2309
Levels.....	2000
Surface Works.....	2802
Houses.....	200
	<hr/>
	\$7811

#### MACCAN.

The returns from this mine state that 118 tons have been raised during the year and that the sum of \$15.00 has been expended on levels.

#### SCOTIA.

At this colliery mining has been on even a more reduced scale than in former years. The quantity of coal mined was 844 tons and an expenditure is shown on

Adits and Levels.....	\$287.40
-----------------------	----------

#### SPRING HILL.

The Spring Hill Mining Company has been formed to work the Macfarlane areas. It is expected that during the ensuing year works of a permanent character will be established. For the

present, a slope 115 feet deep worked by a horse gin yields the coal that is supplied to meet the local demand. 1000 tons have been sold. The returns show an expenditure on—

Levels.....	\$201.13
Surface Works.....	385.00
Houses.....	500.00
Machinery.....	30.00
	<hr/>
	\$1096.13

below a heavy barrier of coal left to dam back the water lying in the old workings, an air shaft nine feet six inches square is in course of being sunk. At the mouth of this air shaft a Guibal ventilating fan 30 feet in diameter will be erected, and also a steam engine by the aid of which the shaft now 345 feet deep will be continued 270 feet farther; at which depth it is expected to reach the coal.

All the old workings to the westward in this seam are now shut off, and as heavy after damp finds its way through the cracks of the measures, and falls along the crop to the surface, in the neighborhood of the Forster Pit, in all probability fire still smoulders over an extensive portion of the workings in that district.

By some means unexplained, the after-damp suddenly found its way into the old workings of the deep seam, and in such volume, that a large district had to be walled off. In the deep seam operations have not been very extensive, but preparations have been made to greatly increase the capabilities of the Cage Pit, by extending the incline and driving levels.

Coke continues to be made of the slack from the main seam, and meets with a ready sale at remunerative prices. The returns show an expenditure as follows:—

Shaft.....	\$4669.66
Machinery.....	6394.15
Houses.....	3208.72
	<hr/>
	\$14,272.53

#### ACADIA.

The regularity that in previous years characterized the working of this colliery, is again observable in this year's returns. The quantity of coal sold, 123,063 tons, exceeds the sales of the previous year, 119,056 tons, and is the largest output from any one mine in the country. The system previously pursued has been continued. The slope, having been extended 370 feet, has now a total length of 1190 feet. Another set of levels are in course of

being driven to develop the new lift. In the upper lifts the levels have been driven to the boundary, and the pillars robbed to such an extent, that the roof has crushed in over a large area of the workings. From the experience gained by working the pillars, it is expected that in future operations of a similar character, a much larger proportion of coal will be won than hitherto; especially when the robbing is conducted in a regular manner.

There has been erected, during the year, a new set of three boilers made of  $\frac{3}{8}$  plate, thirty feet long and 34 inches in diameter. Also, a force pump of six in. diameter and 7 ft. stroke to replace one having only half its capacity. An expenditure is returned as follows:—

Machinery.....	\$7852.19
Surface Works.....	540.50
Houses.....	218.89
	<hr/>
	\$8611.58

### INTERCOLONIAL.

Sold 105,545 tons; an increase of 54,058 tons over the total quantity mined during the previous year. At this colliery, the slopes have been continued to a depth of 1440 feet, developing a new lift of 451 feet, and the mine put in an efficient state for a further extension of its capacity. The driving of the slope took 17 days. A shaft 342 feet deep, in size 14 feet by 6 feet, was sunk in 132 days. It is, for the present, to be used as a downcast for the air. A stone drift has been driven through the trouble, an upthrow of twenty-five feet, that at present bounds the workings to the east, and the extension of the levels in that direction continued. On the western side of the slopes, the levels have been driven to the boundary, and a return air course has been cut up the side of the barrier rib.

A branch road two and three quarter miles long (to connect

The returns show the following expenditure on

Shafts.....	\$ 5942.69
Surface Works.....	443.16
Houses.....	2930.06
Levels.....	1433.26
Machinery.....	1795.27
Railroad.....	20678.76
	<hr/>
	\$33223.20

## NOVA SCOTIA

Sold 60,590 tons; an increase of 48,072 tons. By perfecting the arrangements previously made, without a much further expenditure of capital, this colliery was also enabled to largely increase its business, and with the other establishments on the Acadia seam, find a ready sale for its product in the general market. The construction account is returned as follows :—

Houses.....	\$3525.00
Surface Works.....	1787.00
	<hr/>
	\$5312.00

## VALE.

This colliery has been planted on the McBean areas, to work the deep or 8 foot seam. Two slopes now 160 feet deep are being driven on the inclination of the seam, an angle of 30 degrees. The main slope is 16 feet wide, and the travelling way 8 feet wide. Strike of the seam N. 58° E. Mag. A pair of winding engines 12 inch cylinder and 18 inch stroke, built by the Acadia Foundry, New Glasgow, have been erected. Three plain cylindrical egg-ended boilers, 30 feet long by 38 inches in diameter, are in position, and the flues from them lead into a stack 60 feet high, 3 feet 10 inches in diameter.

Seven double houses for workmen and the necessary shops and offices are already built.



Preparations are now being made to construct a railroad, about 6 miles in length, to connect with the provincial road at New Glasgow. The expenditure stated in the returns, is as follows:—

Slope.....	\$3568.00
Surface Works.....	4208.75
Machinery.....	4437.00
Houses.....	4078.00
Prospecting.....	66.12
	<hr/>
	\$16,357.87

On the MITCHELL and BARTON area, an adit has been driven through the measures about 300 feet, on to the extension of the same seam now being opened at the Vale colliery. The workings are as yet very limited, and the extraction small. The seam on this area is found to be 14 feet thick. The returns show an expenditure on

Adits.....	\$249
Surface Works.....	135
Prospecting.....	17
	<hr/>
	\$401

#### **The CROWN COAL, BRICK AND POTTERY COMPANY**

are made no returns for the year. Their operations must, however, have been very small, and it is understood were chiefly in the fire-clay. The quantity of fire-clay shipped, is said to have been 40 tons to Montreal, and 29 tons to Halifax.

The Pictou Mining Company expended \$453.17 on prospecting their area.

## CAPE BRETON.

---

The collieries in this Island experiencing equally with those of Pictou County, the effect of the increased demand for their product were, during the later part of the season, worked to the utmost of their restricted capacity. Their capacity was restricted, not by the want of facilities for extraction or means of transportation from the pits to the shipping wharves, but by the scarcity of manual labor at their command. Skilled workmen were not to be had, but of ordinary labor, except in the height of the season, there was sufficient.

This question of labor, will, in all probability, be the most serious of all that will engage the attention of agents anxious to profit by the expected increased trade of the present year.

In the County of Inverness, the

### CHIMNEY CORNER

Colliery was alone worked. The shipments from which still remain small, through slightly in excess of the previous year. In the mine, the lowest level has been extended to a distance of 800 feet, and faces of work have been carried from it to the full rise, each about 30 feet in length, succeeding one another at a distance of 10 feet. One of Cameron's special steam pumps, No. 6, keeps the mine free from water.

It is proposed to greatly extend the breakwater, and form within the cove a shipping basin to afford greater protection for vessels against the prevailing northerly winds of Autumn. The expenditure on surface works was \$50.00; and on levels, \$150.00.

### SYDNEY MINES.

102,691 tons sold. A decrease of 3,203 tons. This slight decrease was occasioned by the heavy snow storms in December blocking the railway and retarding the shipments. And had it not been

for the want of men the shipments would have been largely in excess.

The workings were conducted in the same systematic manner, employed for many years. More attention, however, was paid to the pillar working which was carried on upon an increased scale.

At the new winning at Loyd's Cove the sinking of the pumping shaft was continued to a depth of 266 feet when a feeder of salt water, 160 gallons per minute, was struck. The sinking was then discontinued, and the lower 32 fathoms of the shaft lined with cast iron tubing weighing 162 tons.

The complete sinking set of 20-inch pumps, with spears, ground spears, crabs, sheaves, &c., were erected, and 29 fathoms of 3-inch plank brattice with oak buntons, guides, &c., were put in and other arrangements completed to combat with the feeder and continue the sinking. The staple shaft which stood at 140 feet was continued to a depth of 280 feet, and 25 fathoms of its depth were cased with cast-iron tubing weighing 72 tons. In his last report Mr. Brown states that the sinking was progressing satisfactorily, and although the feeder had more than doubled in volume hopes were entertained that the water-bearing strata would shortly be pierced, and the feeder tubbed back. The returns give the following expenditure:

Shafts.....	\$14,541.21
Surface Works.....	518.67
Machinery.....	902.68
Houses.....	2283.84
	<hr/>
	\$18,246.40

#### VICTORIA.

9,222 tons sold. The levels in the mine have been extended to the West and the lower one has reached a distance of 22 ns.

the accommodation for workmen has been increased by the

building of several blocks of double houses. In the return the expenditure is thus shown:

Levels.....	\$9546.11
Surface Works.....	55.50
Machinery.....	158.13
Houses.....	5973.22
	<hr/>
	\$15,732.96

#### LINGAN.

38,404 tons sold. An output largely in excess of late shipments.

At the Barrasois the slopes are kept free from water but no means of shipment or transportation have yet been provided. The level under the sea has been extended about 4 chains. An expenditure is returned as follows :

Levels.....	\$2,343.72
Surface Works.....	529.60
Dredging.....	3,621.57
	<hr/>
	\$6,493.79

#### GARDINER.

The crop workings have been abandoned, and a shaft 12 feet, by 9 feet is in course of being sunk, which should it is expected reach the coal at a depth of 200 feet. The upper 15 feet of the shaft have wooden walling, below, the measures are sound and require at present no lining. The position of the shaft is convenient for shipping by the International Railroad, to Sydney Harbor.

Preparations are being made to erect a powerful winding engine, build workmen's houses, shops, &c. The expenditure is stated to be :

Shafts.....	\$9,833
Houses.....	7,016
Machinery.....	895
Surface Works.....	343
Railway branch.....	855
	<hr/>
	\$18,942

## RESERVE.

This colliery is now fully equipped to work the crop coal of the Pheian seam. Two slopes, 10 feet wide, have been driven to a depth of 810 feet and levels won out on either side. A single horizontal engine, 22 inch cylinder, 3 feet 8 inch stroke, geared one to three with the following shaft, on which drums 5 feet 8 inches in diameter, are driven by friction gearing. Five boilers 30 feet long, 3 feet in diameter, of half-inch plates, well fitted, each with two safety valves, water gauges, &c., erected in an adjoining building, supply steam for the hoisting engine, machine shop, and for the steam pump at the bottom of the mine. The flues from the boilers lead into a stack 53 feet high. A more than usual amount of attention has been given to the dwellings of the workmen; each is supplied with an out-house, a necessary adjunct for the comfort of the people, but one, unfortunately, not always so considered by the builders of mining villages. Neat picket fences surround the plots of ground set aside as gardens for each household.

The narrow guage railroad connecting the Lorway, Emery and Schooner Pond Mines with this colliery, and the shipping pier at Sydney is equipped with three of Fairlie's double engines and 200 wagons. Each wagon, 12 feet 6 inches long by 7 feet wide, is fitted with side doors and pitched floor, and has a capacity when loaded of 4 tons.

The following analysis was made by the Manhattan Gas Light Company, New York:

Charge, 2240 lbs. Time 3 h. 50 m.

Maximum yield per ton..... 9950 ft.

Illuminating power at 9500 ft..... 13.17 candles.

Coke, per ton, 38 bushels..... 1520 lbs.

Gas purified by one bushel lime..... 2380 ft.

	New York.	London.
Volatile matter.....	34.50	36.26
Fixed Carbon .....	59.50	Coke .....62.74
Ash.....	6.00	Water.....1.00
	<u>100.00</u>	<u>100.00</u>

	London.
Carbon.....	77.41
Hydrogen.....	5.47
Oxygen and Nitrogen.....	9.30
Sulphur.....	2.47
Water.....	1.00
Ash.....	4.35
	<hr/>
	100.00

In the returns the expenditure is given :—

Levels.....	\$9767.60
Houses.....	6973.65
Surface Works.....	6916.49
Machinery.....	1590.85
Prospecting.....	96.40
	<hr/>
	\$25,344.99

### LORWAY.

A shaft 66 feet deep, 11 feet by 9 feet, and divided by a brattice, has been sunk to work the crop coal until the pair of pits now in course of sinking have developed the seam. A single horizontal engine 14 inch cylinder two foot stroke, geared one to three with drums five and a half feet in diameter is used for hoisting. Two boilers of the same construction as those at the Reserve supply the steam. The pit frame is 45 feet high and the pulleys 7½ feet in diameter.

The sinking of the permanent pits gets on but slowly as there is a great deal of water to contend against. The pumping shaft is now down 110 feet. Two portable engines of 10 and 16 horse power are in use for hoisting and supplying steam for two steam pumps 7 inch cylinder and 12 inch stroke.

The construction account is returned as follows :—

Shafts.....	\$14,459.90
Levels.....	5145.52
Surface Works.....	8159.80
Machinery.....	11,347.17
Houses.....	17,688.02
Prospecting.....	794.45
	<hr/>
	\$57,594.86

## INTERNATIONAL.

Operations were suspended at this colliery at the close of the previous year and were not resumed until September. The business in consequence was much below that of the preceding year. An additional engine has been connected with the single horizontal engine hitherto used for hoisting, but in other respects the arrangements have not been changed. The preparations made in the previous year to increase and regulate the supply of fresh air passing through the workings have not been carried out; and should it be considered desirable to work the mine extensively and uninterruptedly during the ensuing summer a furnace or fan should be forthwith built.

The following is an analysis of the coal made by the Manhattan Gas Light Company, New York, January 10th, 1871.

Maximum yield per ton.....	10,106 feet.
Illuminating power at 9500 feet.....	1703 candles.
Coke per ton.....	38 bushels.
Coke per ton.....	1440 lbs.
Gas purified by one bushel of lime.....	2314 feet.
Ash in coal.....	5.0 per cent.
Volatile matter.....	38.5 “
Fixed Carbon.....	56.5 “
	<hr/>
	100.0

The expenditure is returned as follows:—

Shaft.....	\$340.00
Surface Works.....	177.00
Machinery.....	3140.00
Levels.....	885.47
	<hr/>
	\$4542.47

## GLACE BAY,

30,715 tons sold; a decrease from last year of 8,800 tons.

Hampered by the want of labor when the demand sprang up, the colliery was unable to increase its output beyond the limited

quantity stated. No changes in the method of working or in the general arrangements at the Hub have to be noticed.

The crop workings on the Harbor seam having extended so far from the Little Pit, it has been thought advisable to prepare for a new winning 500 yards to the deep, and the sinking of two shafts about 100 feet apart has been begun. The pumping shaft, 10 feet in diameter, is walled with stone three and a half feet thick to a depth of 19 feet. The "Sterling" to be used as a hoisting shaft is similarly walled and is 10½ feet by 11 feet. The coal is expected to be struck at a depth of 230 feet. The Hub seam is so easily wrought that the average quantity of coal cut per man per day is 6.5 cubic yards. An average unusually high, and, I believe, not surpassed by the cutters in the thick seams of Pictou County. The expenditure stated in the returns is as follows:

Shafts .....	\$3207.50
Levels .....	225.66
Surface Works.....	272.75
Machinery.....	819.17
Houses .....	1260.71
Railroad .....	529.00
Piers .....	703.38
	<hr/>
	7018.17

### CALEDONIA.

44,186 tons sold; an increase of 19,531 tons.

Shipping from this colliery was steadily pursued for nearly the whole season, and although the daily yield was small the sum total amounted to considerably more than in any previous year. In the mine, the levels have been extended and more rooms broken off from them. A headway has been driven to the crop which is to be used as an intake for the air during cold weather, so as to relieve the pumping shaft and keep it free from ice. The lodgment has been enlarged, and has now a capacity of three or four day's water.

The pit-tubs have been fitted with end doors to save breakage of the coal.



At Port Caledonia the water has been deepened by dredging, and vessels drawing 17 feet have been loaded.

The returns show an expenditure of \$1,479 on levels, and \$1,500 on houses.

### CLYDE.

2,606 tons sold.—Late in the Summer arrangements were made by which the product of this colliery might be shipped at Port Caledonia. A railway about half a mile in length was constructed and a shipping berth erected. The establishment, the returns stated, was put in order by an expenditure on

Shafts.....	\$204.50
Levels.....	128.00
Surface Works.....	1051.50
Machinery.....	550.00
Railway.....	8020.50
	<hr/>
	\$9954.50

### SCHOONER POND.

This colliery, connected with Sydney Harbor by a branch of the Glasgow and Cape Breton Railway, is in course of development.

The following are analyses of the coal made at the Royal School of Mines, London;

Carbon.....	78.10.	Volatile matter.....	35.43
Hydrogen.....	5.48.	Coke.....	61.90
Oxygen, &c } .....	7.81.	Water.....	2.67
Nitrogen			<hr/>
Sulphur.....	2.49.		100.00
Water.....	2.67.		
Ash.....	3.45.		
	<hr/>		
	100.00		

A slope 10 feet wide with side slopes 6 feet wide are being driven to the deep. Nine blocks of workmen's houses, the necessary workshops, offices, and requisite hoisting and pumping machinery are being built and erected at an expenditure for the year, the returns state on

Slopes.....	\$7,615.60
Surface Works.....	1,859.72
Houses .....	22,946.14
Machinery .....	4,112.91
	<hr/>
	\$36,534.37

### BLOCKHOUSE.

42,748 tons sold.—Active operations were resumed during the Summer at this mine, and a fair amount of business transacted. The operations were of the ordinary character with this important addition that pillar working, in two districts of the pit, was commenced and so far conducted with success. As a large area of the seam now stands in pillars the immediate further extension of this class of work should be seriously considered.

The shipping wharf has been strengthened at an expense of \$3,000.

### GOWRIE.

46,602 tons sold ; an increase of 4,171 tons.

A new shaft has been sunk three quarters of a mile from the Odiorne pit, on to the extension of the North-west levels. It is to be used as a hoisting shaft and is 12 feet in diameter, lined with wooden cribbing to the depth of 24 feet.

Before sinking was commenced a borehole to carry off the water was put down by the aid of a portable engine and a manilla rope used in place of the ordinary hand-rods. The Breakwater has been further extended and is now 1,430 feet in length. The total cost

of the structure, it is stated, has been \$90,000. The construction account has been returned as follows :

Shaft .....	\$2,610
Boring .....	450
Levels.....	270
Surface Works.....	235
Machinery.....	450
Houses.....	350
Breakwater.....	2,020
	<hr/>
	6,385

### SOUTH HEAD.

1859 tons sold. The resumption of work in the mine was undertaken late in the year, but the temporary character of the loading wharf preventing shipments being made, necessitated a further suspension.

## **GOLD MINES.**

---

Since the last report was written a complete change has taken place in the system of working the gold mines, and with the change there has been a great falling off in the number of men engaged, and a consequent decrease in the yield of gold. The change referred to, is the almost total discontinuance from operating by companies and the introduction of the system of working the mines by tribute.

Two or more practical working miners agree among themselves to take a mine, often one that an agent for a Company has failed to work at a profit, for a term of six months or a year, with the understanding that they pay to the owners a percentage of the value of the gold extracted. They then venture their time and money in the speculation. Trusting by honesty, economy and by faithful working not only to make fair day's wages but also earn a return on their capital, time, adventured.

immediate safety of the mine is as a rule used, and in districts where the country rock is fissile, a crushing in of the walls sooner or later takes place.

Much has been written on the general want of method attending Gold mining in Nova Scotia and sweeping condemnations of the management and want of skill shown while working the mines have been published. Much doubtless most justly, and yet, somewhat hasty comparisons would seem to have been drawn between the wide and comparatively easily wrought leads of other districts and the thin leads of this Province enclosed in hard and tough country rocks.

The great expense attendant on the mining of the quartz has had as much if not more to do with the failures that have hitherto, with but few exceptions followed all ventures in the gold fields.

No manner of doubt, however, can be entertained that the treatment of the quartz after extraction is still crude and imperfect, and the results obtained in our mills are far behind those of other countries.

Professor Hind in his late report on the Renfrew, Oldham and Waverley Districts has ably treated on these causes of failure, and has shown the practise of Colorado, California and Australia. His report should be read, and read with care, by all who are interested in the gold mines. I wish to add merely as a foot-note to his remarks that the invariable experience on the Pacific slope has been, "that the best mill men always have been good mechanics."

In the methods of mining, the improvements that have taken place in other parts of the world, as for example in drilling and blasting have not been here yet applied. Three men may still be seen laboriously preparing a hole for an ordinary blast, using at least an inch and a quarter drill;

while no stronger blasting material than black powder is consumed. Elsewhere small holes, single hand drills, and a powerful explosive are coming into all but general use. To introduce this system here merely requires the importation of suitable material. Our miners are fully alive to the advantages to be gained by a reduction in the cost of blasting, and seconded by their wishes on the subject, I spoke to Mr. J. Stairs who kindly undertook to make the necessary enquiries. ,

He informs me that Dualin made in Massachusetts costs there \$1.20 per pound while Dynamite manufactured in England can be retailed here for \$0.90 per pound. The English manufacturers say that an ounce of their strongest powder is equal to one pound of the best black blasting powder. The advantage of using this material is at once apparent.

“It may be stated that the great advantage accruing from the use of Dynamite consists, not in diminishing the cost of powder as an item of expense, as in diminishing the cost of using it. The difference in the cost of powder is trifling in comparison with the difference in the cost of drilling, charging, tamping, convenience in wet work, and effectiveness of blasts.

Dynamite, as a general rule, throws rock less and breaks it more, and extends its effects much deeper than ordinary blasting powder; and those who use it soon learn not to

Bandmann, Neilson & Co., of San Francisco, the agents of Messrs. A. Nobel & Co. Having had personally some experience of the use of dynamite, I feel sanguine of the success it will meet with in our mines, and trust the next report will confirm my anticipations.

was anticipated. He, however, hopes to make alterations which will greatly improve its efficiency.

The Phoenix Company, of Toronto, suspended operations early in the year, having developed the Eureka lead by two shafts, 118 feet apart, sunk to the depth of 100 feet and 24 feet, and by drifts to the east and west 55 feet and 26 feet respectively. They also worked the Charlotte lead which lies 29 feet to the rise of the Eureka, on which they sank a main shaft 110 feet deep and a shaft 70 feet to the east, 63 feet deep.

### SHERBROOKE.

The property of the New York and Sherbrooke Company has been worked on tribute by Israel West, who, operating principally on the Harrison or South lead, employed on an average twenty-one men. The main shaft of the South lead is down 250 feet, and the east and west tunnels are driven to distances of 180 feet and 120 feet. The pumping and hoisting is done by steam power.

Mr. West prospected for many months the Hayden and Derby property, over which he has a tributing right, but met with very indifferent success until September, when he was fortunate enough to strike a lead, which promises very encouraging returns.

The Archibald lead on the Alexander property has been re-opened after abandonment for seven years. The old workings were found to consist of two shafts, eighty feet apart, sunk to depths of 45 feet and 35 feet.

The McLean or Little lead on the Wellington and Alexander properties which had remained unworked for eight years was re-opened by tributers in September. The previous operations had been conducted to a depth of 125



feet. The mining on the Wellington lead which had been continuously carried on for a number of years past was discontinued in August, when the excavations had reached a depth of 500 feet. It was found that the machinery on the ground was insufficient for working the mine profitably at that depth, and the owners not deeming it advisable for the present to supply heavier pumps and a more power-

40 feet, and stoped the intermediate ground. From the lead, 14 inches wide, they took 78 tons of quartz which yielded 60 oz. of gold. Encouraged by such a promising return, they removed the machinery that had been in use on the Palmerston lead and applied it to the further development of the new lead.

The Meridian Company, after working the Stryker lead for the greater part of the year, suspended their operations on it, to prospect for the new lead discovered by the tributers on the Palmerston property.

On the Cleverdon property, the British Company have been also prospecting for the continuation of the same lead.

The Hamilton Company sank a shaft 80 feet deep on a small lead 150 feet to the north of the Ferguson lead which they had previously abandoned, but finding the lead too small to pay expenses, they have suspended all work. Operations have altogether ceased on the property of the Caledonia Company.

### HARRIGAN COVE.

This new district is situated about three miles to the westward of Mosher's River ferry, and about half a mile back in the woods from the main shore road. Attention was drawn some years ago to this locality by a large boulder of quartz full of sights being found on the surface. It has been prospected in a very systematic manner and a belt of numerous ledges some 20 inches wide has been exposed. From the croppings of such leads as have been stripped, many specimens have been broken

The general course of the leads is N. 68° W. Mag.

Prospecting has been also made near the road about half way between Harrigan Cove and Mosher's River.

## TANGIER.

The property of the Burlington Company was, in the early part of the year, let to tributors, who worked a little on the Leary and South Lake leads, and also prospected for the Pig South lead, which they proved on the property. Subsequently all work was suspended.

Operations have been resumed on the oldest location in the Province, after a suspension of seven years. Mr. Forrest, as a tributer, has been working the areas of the Tangier Mining Company, and has stoped the Little South lead 300 feet in length to a depth of 25 feet.

On Froud's property but little was done on the Hill lead while work was steadily prosecuted, though on a small scale, on the Dunbrack lead, which was opened on a length of 160 feet to a depth of 50 feet.

The Strawberry Hill Company, having bought the Forrest or Confederate property worked both together for a short time in the early part of the year; but finding the

## MOOSELAND.

Mr. J. Irving has since June been steadily working on tribute the mines of the Humber Gold Mining Company. He has stoped along the Irving lead above the water level over a length of 180 feet, reopened the Furnace lead and sunk the shaft on it 20 feet additional, and has erected a water wheel to do the pumping at the eastern end of the Irving belt of leads.

## LAWRENCETOWN.

Operations were not resumed in this district until September when some tributers took hold of the Waddelow Lead which had lain idle for three years, and satisfied with the prospects made preparations to work it steadily during the coming winter.

## MONTAGU.

DeWolf & Co. have been working on a property that contains the old Fisher lead or the North lead as it is now known. This lead they opened on a length of 100 feet by three shafts to a depth of 25 feet and found it about 14 inches in thickness. They also opened the South lead by two shafts 60 feet apart, and found it composed of two leads 8 inches and 22 inches thick separated by about a foot of slate. They have erected a mill of 8 stamps close to their mines.

Some tributers in the Spring worked on the St. Patrick lead on the Montagu Company's property, but as they did not

His principal operations have been on the western extension of the lead; while to the east, where the lead is pinched and faulty, the workings have been of a more exploratory character. He has erected a 10 stamp mill and fitted it in a very efficient manner. The stamps weighing 550 lbs. each are run at a speed of 60 drops per minute. The auriferous pyrites, of which the mine yields a considerable quantity, is as far as possible separated by hand, to be subsequently treated. For the collection of the remainder, more intimately mixed with the quartz, and which cannot be so picked out, arrangements will shortly be made.

The Montagu Company have suspended operations.

### WAVERLY.

By DeWolf & Co., mining operations have been steadily conducted on the Union lead, the working of which was resumed in the beginning of the year, when they abandoned the operations on the Brodie lead.

The American Hill Company let their property on tribute to a company of miners who have employed, altogether, some 16 men and worked continuously during the greater part of the year. The pump at present in use being unequal to command all the water made to the deep, operations were chiefly carried on by stowing the ground between the two

boiler with engine attached, to meet the increased requirements of the mine.

The latter, Mr. Shaffer, at first operated on the Britannia lead, but having met with a fault, which a cross cut of 30 feet through country rock failed to prove, he subsequently directed his energies to the working of the McKenzie lead, in which he placed a pump, 5 inches in diameter, 22 inches stroke, and drove it by power obtained from the Napier mill 1300 feet away, by means of wooden rods suspended on trestles. The extension of the McKenzie lead was worked to a small extent by Mr. Andrews.

### RENFREW.

Mining in this district has been almost altogether abandoned. The Ophir and Hartford Companies have both suspended operations. On the property of the former, Mr. McClure has worked the McLeod lead to a small extent on tribute. By other parties, the Peifer lead has been reopened after an abandonment of five years, and a water wheel erected to pump and hoist. The lead lies very flat, not greater than an angle of  $60^{\circ}$ , and the stoping is carried on at a depth of 150 feet from the surface.

### MOUNT UNIACKE.

A few tributers worked in a desultory manner among the leads on the Lake side, Montreal and Uniacke properties, stripping the surface and removing patches of ground left unstoped and easily accessible. The result of their unsystematic method of working will be to render future opera-

### GAY'S RIVER.

The principal operations in this district have been on the areas owned by Mr. McDonald, who has driven a slope in the hill side for 270 feet, at the bottom of which, levels have been driven to the right and left for 40 and 80 feet. The conglomerate and slate have been removed by long work in places to a height of 9 feet, and the workings have been carried back from the levels toward the crop.

On the adjoining area, work was commenced in the Autumn, and a slope is in course of being driven to develop the claim in a similar manner. An 8 stamp mill has been erected.

### CARIBOU.

Mining operations were conducted in this locality during the year on a more limited scale than usual.

est was stoped from its eastern extension without discovering any inclination to dip. Its thickness varied from 3 to 14 inches.

On the main lode a new shaft was sunk 20 feet and fitted with a pump connected by flat rods with the driving gear in the mill. An elevated tram road from this shaft to the mill was begun, a substantial shaft house built, and much of the machinery in the mill renewed.

Operations were wholly suspended from the latter part of April until the middle of November, when the property was let on tribute to Mr. Touquoy.

During the months of November and December about 400 feet of trenches were cut in search of new and in examining already known leads, and the pump was removed from the intended main shaft to the so-called Lake shaft 160 feet further east.

On the Free Claim lead Messrs. Jennings and Wilson sank the west shaft 20 feet deeper and the east shaft 30 feet deeper or to an even and total depth of 53 feet.

The Taylor lode has been stoped to a further length of 50 feet and to an average depth of 10 feet.

At the Irving and Miller mine 3 open cuttings were made. The whole amounting to about 60 feet in length, and to an average depth of about 8 feet.

The rest of the work done in other sections of the country was merely of an exploratory character.

#### AFTER TREATMENT OF TAILINGS.

The only district where the washing of tailings has been conducted is Sherbrooke, where Mr. Twist has successfully treated the refuse from the Palmerston mill. He first tried



a buddle, but the results were not satisfactory. He then erected three parallel tables 8 feet long, 2 feet wide covered by seven copper plates each terminated by a riffle.

The tailings, first well mixed with a small quantity of water, are passed through a revolving screen of one eighth inch mesh and the coarse material separated. The fine then flows over the tables, on the two upper plates of which numerous small jets of water impinge to stir up the sand and keep it from settling.

## IRON MINES.

Consequent on the great rise in the price of iron the deposits of ore in this country have received a good deal of attention. Numerous licenses to search have been taken out in the neighborhood of Whycocomagh, Cape Breton, and the hill section of Pictou County.

At Whycocomagh the iron ore is found in slates probably of Silurian age. One vein about 4 feet 6 inches thick has been opened not far from the waters of the Bras D'Or Lake, and convenient for shipment. The ore has an earthly appearance but analyses of average samples have given, it is stated, 65 per cent. of metallic iron.

### ANALYSIS OF IRON ORE FROM THE INDIAN RESERVE, BY DR. HAYES, OF BOSTON.

Pure Iron.....	60.90
Oxygen.....	23.30
Sulphur.....	11
Alumina.....	1.40
Lime.....	1.85
Magnesia.....	1.64
Silica.....	10.80
	<hr/>
	100.00

Many licenses were taken out in the vicinity of Springville on the East river of Pictou County, and prospecting and explorations carried on with vigor, but no reports of such explorations have been received by this Department. The general neglect to comply with the requirements of section 90 of the Mines and Minerals Act is greatly to be regretted. Much information acquired by explorations which might annually be recorded is thus lost, and can only be regained at a further sacrifice of much time and money.

From personal observation I noticed that most of the exploring was on veins of red hematite and the specular variety; the veins of red hematite presenting the most promising appearances. Near Webster's, on McLellan's Mountain, a vein varying in thickness from 8 to 40 feet has been proved by Mr. Donald Fraser to extend for some two miles and a half; the country rock being a soft slate and the gangue of the vein siliceous.

Fresh discoveries of limonite are reported to have been made not far from Glengary R. R. station, but the locality has not been clearly defined.

The only mines actually in operation are those at Clementsport and Londonderry.

The POTTER mine the property of the Annapolis Iron Mining Company at Clementsport, neglected for several years, was reopened during the summer under the management of Mr. A. Conant. During the ten weeks that the mine was worked about 1000 tons were extracted and employment given on an average to 15 men. Of the quantity mined, 600 tons were smelted in the furnace on the ground and a yield of 163 tons of pig iron was obtained and shipped to Boston.

The yield of metal from the furnace was much smaller than analysis of the ore warrants; and future runs in charge of reliable furnacemen will doubtless be more successful. Preparations are in progress to establish the mines and iron works on a permanent basis, and during the coming season large quantities of raw ore probably will be exported for reduction in the furnaces of Pennsylvania.

#### LONDONDERRY

adit lately driven 240 feet below the back of the vein intersects a body of ore as extensive as any cut nearer the surface. Hence the supposition hitherto generally held that this vein was similar in character to the "gnash veins" of Missouri would seem to be incorrect, and the probabilities are that the vein carries productive ore to depths which will not be reached for many years to come.

The difficulties connected with the transportation of supplies which have hitherto greatly retarded the growth of the iron business at Londonderry having been in a measure removed by the opening of the Intercolonial railroad, the development of this important industry may now be expected to progress with rapid strides.

---

## ACCIDENTS.

---

The high average of this years fatalities cannot be accounted for on the ground that the coal mines of the Province are peculiarly dangerous. With but few exceptions the roofs over the seams are sound and require little or no timber while the seams themselves can generally be wrought with perfect safety.

- - - - -

---

TABLE OF CONTENTS

# TABLE OF ACCIDENTS.—(Continued.)

Mine.	Cause.	Extent.
Victoria .....	Fall of coal.....	Fatal.
Sydney.....	Fall of coal.....	Ribs broken.
" .....	Fall of stone.....	Fatal.
Reserve .....	Crushed by wagons.....	Severely injured.
Intercolonial .....	Explosion of gas.....	Very seriously burnt.
" .....	" .....	Fatal.
" .....	" .....	Severely burnt.
Lorway.....	Crushed by cage.....	Fatal.
Gowrie.....	Crushed by machinery.....	Fatal.
Acadia .....	Fall of coal.....	Fatal.
Intercolonial.....	Explosion of gas.....	Slightly burnt.
" .....	Crushed by tubs.....	Fatal.
" .....	Explosion of gas.....	Slightly burnt.
Victoria .....	Fall of coal.....	Severely bruised,
" .....	" .....	" .....
Gowrie.....	Run over by wagon .....	Fatal

## FATAL ACCIDENTS.

Explosion of gas, 1 ; explosion of powder, 1 ; falls of coal and stone, 6 ; accidents in shafts, 3 ; crushed by machinery, 1 ; crushed by tubs, 2 ; total, 14.

### *EXPLOSIONS OF GAS.*

Of the five explosions of gas reported only one was attended by fatal results.

Numbers 1, 14, 23 and 25 were caused by carelessness or inattention to orders on the part of the individual men who suffered and call for no special comment.

Number 19 was an accident of a much more serious character and was undoubtedly caused by the gross negligence of one of the party in consequence of which all were severely burnt. Without minutes of the evidence adduced at the inquest, I am unable to accurately state how the accident did occur, but from what I heard at the colliery shortly after the occurrence I understood that William Skelly, Alexander Findlay and David Campbell worked together in one bord. The two former as miners, the latter, quite a young man, as loader. On the morning of the 7th of October when they went down as usual to work they were warned by the fireman that gas had accumulated in their bord. The two miners with safety lamps in their hands went in, leaving Campbell with a naked light in the return level. They brushed the gas out as they thought and calling to Campbell came down to meet him. Just as he reached the corner, and before entering the bord, the gas fired at his lamp and all three were severely burnt. Apparently Campbell was the least injured, but he never recovered from the shock and died fifteen days afterward.

### *EXPLOSION OF POWDER.*

Accident number 11 showed a recklessness by no means uncommon in the handling of powder by miners. John Leadbeater was engaged at the Intercolonial colliery charging a hole with





powder on the 13th of June. Through negligence some powder had remained in his "skip" from the previous charging, and this falling on his naked light standing close by him on the pavement flashed, and communicated the flame with the powder in the canister, causing it—a quantity of about 5 lbs —to explode and injure him so severely that five days subsequently he expired. His companion, William Mirtan, was at the same time seriously burnt by the explosion but finally recovered.

### *FALLS OF COAL AND STONE.*

Most of the casualties caused by falls of coal and stone were due to the neglect of the persons injured, to set props and sprags or remove blocks of coal and stone known to be loose and unsecured.

Accident No. 2. Norman McIver, but the moment before he was himself crushed, had warned those working with him of the danger in which they stood. He had sought for a prop with which to temporarily protect himself, but not finding one in any of the bords near, returned to take down the shaken roof coal. He commenced to do so, when a greater quantity fell than he looked for, and his life was sacrificed. Accidents will sometimes occur with the most careful men, but usually that indifference which grows on men inured to dangers is the source of most of these falling under this head.

No. 3. Angus McCormack working the pillars at the Sydney Mines, was crushed by the fall of a stump of a fossil tree, "a caldron bottom," from the roof. The fall of these blocks of stone from the "pot holes" is always sudden and their position in the roof often escapes the eye of the most experienced miner.

No. 15. Occurred at the Victoria Colliery. Edward Winter was a filler in the pit, and on the morning of the 6th September having some spare time on his hands and desirous of learning how to cut coal, went into one of the rooms where Malcolm McNeil and John Carey were at work and asked Carey for a "spell of the pick;" his request being granted he began to work at a block of coal left in the boding. He struck but a few blows before a mass of coal weighing over a ton broke away from the face and falling on him crushed

him instantly to death. The seam being highly inclined when the working face is holed and sheared, masses of coal are apt to break off suddenly especially where a "lype" runs through the coal. As McNeil and Carey left a block of coal unwrought in the holing presumably fearing some such accident, it seems to me they were greatly to blame for allowing Winter to work where he did.

September 13th—Jas. Lannand a pit driver was instantly killed by a mass of stone falling upon him from the roof, at one of the stations where the boys wait with the horses for the empty tubs going inbye. The roof is of freestone and had stood secure for two years. It was supposed to be solid but it appears there was a parting in it about 10 inches up at which point the stone separated. At the inquest on the body, one of the colliers stated that he had observed a crack coming in the stone a day or two before and told two of the driver boys to inform the deputy or overman. This they neglected to do and a fatal accident was the result.

No. 7. McInnes neglected to sound the coal still standing from his last shot before he began to wedge down a block not detached, and a mass hanging above fell on him and killed him.

No. 22. A similar case to No. 15. Reeves was working a stump of coal left in the holing when a mass of coal fell from the face and crushed him to death. Unlike Winter, he worked contrary to the advice of his partner.

### *ACCIDENTS IN SHAFTS.*

No. 4. William Summers was a sinker at the new winning at the Sydney mines. When stepping out of a tub into the mouth of a drift which opens into the staple shaft he missed his foothold and fell to the bottom of the shaft, a distance of 22 fathoms.

No. 8. When the men were returning after dinner to their work in the Meridian (gold) mine, Sherbrooke, and were descending the shaft, Angus Boyd lost his hold and fell a distance of fifty feet, passing five men who were on the ladders below him without touching them. The deceased is said to have been subject to fits of giddiness after smoking much. A pipe was in his mouth when he fell.



No. 22. This accident was precisely similar in character to that which occurred to John Lockman two years previously at the neighboring International colliery, and was caused by the deceased Anthony McDougall, incautiously leaning over the mouth of the shaft down which he wished to call. The cage in descending struck him and he almost instantly expired.

#### *ACCIDENT BY MACHINERY.*

No. 21. Charles Carmichael was the night pumping engineer at the Gowrie colliery. On the night of the accident the water was "out" early and the engine stood for some hours. When he went to start again the engine stuck on the centre, the steam being low, and in order to get the engine off the centre he threw his weight on the fly-wheel. Incautiously he placed both feet on an arm of the fly-wheel, and the engine starting suddenly, before he was able to extricate himself he was drawn into the race and thrown violently against the wall. His injuries were such that he died almost immediately.

#### *CRUSHED BY TUBS.*

No. 24. This accident happened to a lad who had not been working long underground. He was a loader at the Intercolonial colliery, and, being at work near the foot of the slope, was called by the onsetter to help him replace a tub which was off the track. While so engaged, a coupling link in the rake of tubs broke and four of the tubs ran back, caught him, and crushed him so severely that he lived only three days. Those with him succeeded in making their escape, but he, unaccustomed to the position, failed to catch in time the meaning of their warning cries.

If the above list had included accounts of one or more accidents from *Explosions of Steam* no astonishment would have been caused in the mind of any one familiar with the condition in which steam engines are now often kept at some of the mining establishments. A condition probably due to a false spirit of economy engendered by the slackness of trade during late years.

the brickwork, or with plates strained and bulged or covered with patches. In Great Britain the Mines Regulation Act under the head of General Rules states: "Every steam boiler shall be provided with a proper steam gauge and water gauge, to show respectively the pressure of steam and the height of water in the boiler, and with a proper safety valve." And these provisions are not always to be met with in this country.

As illustrations of the utter recklessness with which men will expose their lives to dangers, when the dangers, although acknowledged imminent, are familiar, invisible and temporarily doubtful, I mention two cases; both in connection with marine boilers in tug boats at Cape Breton.

One boiler, although repeatedly repaired when cracks had suddenly appeared and seams had started, was used in that condition for several years, and until early last Winter when it actually exploded, sinking the boat, but luckily killing no one.

The other, in bad order on its first arrival four years ago, was still in use at the time of my visit to Cape Breton in September. It had been repeatedly patched and repatched, and was never safe, if safe at all, except with a much lower pressure of steam than the tug boat required. It has, I have been since informed, blown a hole in its shell, and is now likely to be condemned. I was once on board the boat, when the engineer became interested in a race, and without any urging, forced the boiler to a pressure of 55lbs., or 20 lbs. beyond a pressure, that, but a short time before he had complained of as unsafe.

To lessen the danger from similar sources of accident, there is the Steamboat Inspection Act, which has only to be enforced to be of service: but land boilers are under no supervision whatever. Still, rules and regulations, if not authorized with due care, may become as dangerous as lawless recklessness. It was only last Summer that riding in the cab of a locomotive on a colliery road, I noticed with much surprise the levers of both safety valves tightly wedged down, making it utterly impossible for steam to escape at any pressure. Pointing it out to the driver, I asked the reason, as I saw the Salter balances were new and apparently in order. His reply was, "Oh! the office ordered those thimbles to



be put on the balances to let the valves blow off at 85 lbs., but finding that that pressure was not sufficient for the work to be done, and not being allowed to remove the thimbles, *I wedged the levers.*" The officials in charge of the road could hardly be otherwise than aware of the manner in which their instructions, if carried out to the letter, were broken in spirit. However this was a case requiring only to be mentioned in order to be remedied.

I have mentioned the above cases for the purpose of showing that the men of Nova Scotia have no greater regard for the value of human life than the men of Great Britain and Pennsylvania, where such accidents as the Hartley, the Oaks, and the Avondale disaster happening, aroused the spirit of the people of those countries to call on their governments to interfere and endeavor by wise legislation to guard against such wholesale slaughter in the future. In Great Britain inspection has been attended by a marked diminution in the number of accidents. In the anthracite regions of Pennsylvania the stringent bills passed by the State Sessions of 1870 and 1871 have been actively enforced, but have been in operation for too short a time to have any effect. In this Province, guided by the experience of Great Britain, the legislature appointed an Inspector of Mines, with the understanding that he should be ruled by the practice of English Inspectors. My predecessors in office governed themselves according to that understanding, but as I have had personally no experience of the working of the Inspection Acts of Great Britain, I should prefer to see a *written law*, not only for my own guidance, but also for the guidance of those actually engaged in mining, of whom a similar knowledge is required.

I therefore beg leave to call the attention of the Government to that which in my humble opinion seems an incompleteness in the present law relating to mines and to suggest (for the better preservation of life and property) an immediate and serious consideration of the necessity that exists for explaining more fully and explicitly section (5) of the Mines and Mineral Act, rather than to wait until some appalling disaster,—from which happily the

---

In view of the increasing royalty and the inevitable law which annually requires the sacrifice of a proportionate number of the men engaged in mining, should a Bill similar in purport to the Mines Regulation Act of Great Britain receive the approbation of the Legislature, it might well be supplemented by an agreement on the part of the Government to insure the lives of all miners against fatal accidents, demanding no premium from the men and agreeing to pay, say: \$200 to the family of each unfortunate man, to every widow \$1 per week for ten years or until marriage, and to every child \$1 per week; to boys until they are 12 years of age and to girls until they are 16 years of age. If such an agreement should be carried out it would obviate a good deal of suffering and misery.

I wish also to state that several of the Agents have called my attention to the different interpretations of the term "slack" as now rendered by the practice at certain collieries and the rough method adopted by others in estimating the quantities of coal sold and shipped.

As the varied practice is in consequence of the absence of legal definitions and requirements, I deem the settlement of these questions, which not only effect the amount of royalty due the Crown but also cause jealousy among the operators, to be of great importance, and I beg to suggest that an opinion be taken from persons who prior to the Act relating to the surrender of the mines to Her Majesty in 1858 were in the employment of the General Mining Association and capable of authoritatively stating what the clause, "*except coal now known in the said Province as slack coal*" positively meant.

I have the honor to be

Your obedient servant,

HENRY S. POOLE.

The Hon. Daniel Macdonald, M. P. P.,  
Commissioner of Public Works and Mines.



## APPENDIX.

### DYNAMITE OR GIANT POWDER

Is made by mixing nitroglycerine with infusorial earth. It is an ungrained powder, of a greyish brown color, resembling moist sawdust in appearance. Insoluble in water, it is not affected by time or exposure to air and moisture. It congeals at about 42° Fahrenheit. In the open air or in ordinary packing it burns without exploding. Its combustion produces carbonic acid, carbonic oxide, hyponitrous acid and water. When heated above 212 degrees (the boiling point of water) it throws off noxious fumes and becomes weakened and finally destroyed.

It should, therefore, be kept in some place having a temperature between these extremes:

When frozen it can be thawed by being kept for a time in this proper temperature. It is perfectly safe to thaw the powder by placing the cartridges in an open vessel and the vessel then placed in hot water. When it becomes soft it is ready for use, and its strength unimpaired. As it freezes very slowly, no inconvenient haste is required in its application.

Unlike gunpowder, its explosion is instantaneous. The entire mass of powder explodes as if it were a single grain. This quality in connection with its extraordinary evolution of gases, causes its explosive effect to be especially great in solid substances. Its explosion produces carbonic acid, nitrogen and water.

There are three methods of exploding it: 1st.—By a violent explosion either in or into it. 2nd.—By confining it in a very strong and tight vessel, and setting it on fire, or heating the vessel sufficiently. 3rd.—By a percussive shock so intense as to produce heat and violence equivalent to an explosion. Practically it cannot be exploded by accident. Fire alone will not explode it, nor heat in any form. Nor will any amount of mere weight upon it or simple pressure of any kind explode it. It cannot be exploded by any of the ordinary movements, accidents or incidents which attend its handling, transportation or use. The pressing it into cartridges, or ramming it into bore-holes with a wooden rod however hard, throwing it about, or even the crushing or violence of overturning wagons or collisions of cars will never explode it. The burning or flashing of gunpowder, unconfined, is not sufficient.

When set on fire while under confinement in some *tight* and *strong* vessel, the burning of the powder produces gases, which, finding no escape, at length cause a pressure so great as to produce, with the heat of the burning, an explosion of the unburnt powder.



Caps are manufactured for the special purpose of exploding Giant Powder. They are more heavily charged with fulminate than ordinary ones and corresponding care should be taken in their handling and use. A pair of cutting nippers, with their edges blunted may be used in securing the caps tightly and firmly to the fuse.

*Drill-holes, Charges, &c.*—As to the diameter and depth of holes, and where they should be made, and the direction they should take, and also as to the quantity of powder to be used and many other matters, no definite or arbitrary rules can be laid down for blasting with any explosive. As a general rule, the drill-holes and charges for Giant Powder can be and should be comparatively small. Experience has proved that 3-4 inch octagon steel with 3 1-2 pound hammers used by single hand drillers are best adapted to use the Powder to the greatest advantage. Holes one inch in diameter are abundantly large for all ordinarily heavy work; for light work, correspondingly smaller ones should be made. The quantity of powder should not only be proportionate to the resistance, but the hole should be proportionate to the powder. As by reason of its quickness, Giant Powder in bore-holes is nearly as effectual without tamping as with it, it can be exploded with great advantage without any tamping at all in natural fissure and artificial cracks. It is, therefore, urged that advantage be taken of this extraordinary quality as often as practicable.

*Charging.*—The charge must fit and fill the bottom of the bore and be packed solid. This is an essential pre-requisite to an effective blast. The only way to secure it is this: Take a cartridge as nearly as possible of the same size as the bore and cut it into sections from one to two inches long. With a *hardwood* rammer as large as will run freely in the hole, press these sections into the bore-hole one by one with sufficient force until each section is driven to the bottom and expanded laterally so as to fill the hole solidly in every direction. Any sized cartridge may be used provided it is thus put in. In wet holes, the sections should be rolled in additional paper and the ends closed to prevent the powder from getting mixed with water. *Metallic* rammers must not be used.

*Firing the Charge.*—The modes of exploding the charge are various. After the cap is put on the end of the fuse, and with a pair of nippers pressed firmly around the *edge* into the fuse, some grease, soap or wax should be rubbed round the upper end of the cap to make the same air and water tight. Now insert the fuse into the bore-hole until the cap rests on the charge, then take a small piece of a cartridge, about three quarters of an inch, push it down with the ramrod and press it round the cap so that the latter is inserted in the powder to about half its whole length, but never deeper, because if part of the fuse were in the powder above the cap would be burnt up without exploding. Another way of exploding the powder is to cut off about an inch in length of a cartridge, smaller in dimension than the borehole. press into this piece of so called "priming cartridge" the cap, after it is well fastened to the fuse, and with a string tie both together to prevent the cap from being withdrawn, then let this priming cartridge down the bore-hole until it rests on the charge, and fire the fuse.

The stronger grades of Giant Powder frequently do not require any tamping, and wherever *water tamping* can be used as for instance in all downward holes, it should be applied. It excludes every particle of air and forms a solid column on the charge.

In case the blast misses fire, put in another primer.

**A TABLE***Of the Dimensions of Pit Tubs in use at the principal Collieries.*

NAME.	Track gauge.	Dia. of Wheels	Wheel base.	Height above track.	Width.	Length.	Height.	Capacity.
	in.	in.		in.	in.	in.	in.	C. ft.
Joggings*.....	30	12		37	37	48	23	23.6
Acadia*.....	48	11		31	42	60	24	35.
Albion Mines*.....	26	12		42	33	44	28	23.5
Intercolonial*.....	32½	12		31	27	50	24	18.8
Nova Scotia*.....	48	12		41	40	60	28	38.8
Blockhouse.....	26	11		43	33	43	30	24.6
Caledonia*.....	23½	12		44	33	40	30	22.9
Glace Bay*.....	30	10		36	33	60	24	27.5
Gowrie.....	24	10		38	31	42	26	19.6
International*.....	32	14		45	30	49	29	24.6
Lorway.....	32	11		34	34	44	21	18.2
Reserve.....	26	11		43	32	44	30	24.4
South Head.....	24	8		26	27	42	16	10.4
Sydney.....	24	11		40	34	37	27	19.6
Victoria*.....	24	11		44	32	54	31	31.
Chimney Corner.....	24	11		37	33	42	23	18.4

\*Tubs fitted with end doors.

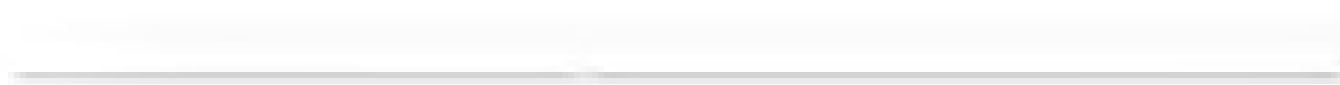
**COAL EXPORTS FROM GREAT BRITAIN AND UNITED  
STATES TO THE ATLANTIC PORTS OF AMERICA.**

GREAT BRITAIN EXPORTED.	COAL.		VALUE. 1871.
	1870.	1871.	
	Tons.	Tons.	
To British North America	224,955	189,274	£ 86,318
U States of the Atlantic	80,014	91,488	61,524
British West Indies .....	174,108	175,335	99,387
Foreign West Indies ....	388,801	281,877	149,574
Mexico .....	8,256	2,821	1,227
U. States of Colombia..	2,893	11,241	7,190
Brazil' . . . . .	261,508	316,417	188,036
Uruguay .....	122,686	96,648	65,888
Argentine Confederation	59,729	62,860	42,970
Total .....	1,263,040	1,227,956	£702,114

UNITED STATES EXPORTED.	COAL.		VALUE. 1871.
	1871.	1872.	
	Tons.	Tons.	
To Canada .....	216,633	.....	.....
Cuba.....	11,932	.....	.....
China .....	1,186	.....	.....
East Indies.....	1,284	.....	.....
U. States of Colombia..	31,383	.....	.....
Hayti.....	2,415	.....	.....
Other Countries .....	3,117	.....	.....
Total.....	267,951	300,878	\$1,369,236









rajs Number of Persons Employed: Number of Horses, etc., at each Colliery during the year ended Decem-

Coal Raised. Tons.	Persons Employed.				Days' Labor.		Average No. of days per person	Average No. of Tons per person	Average No. of days per person	Average No. of Tons per person	Average No. of days per person	Average quantity raised per day—Tons.	Horses.
	In Mine.		On Surface.		In Mine.	On Sur- face.							
	Men.	Boys	Men.	Boys									
and	123	2	4	7	7	319	319	17	45	17	45	8	1
.	1194	6	9	7	13	100	60	92	23	92	23	79	1
.	12883	28	23	23	74	8162	1015	175	85	175	85	74	13
.	1450	11	16	6	19	1121	1002	76	113	76	113	14	2
ston	128846	173	16	76	271	47306	23773	475	258	475	258	515	16
.	120800	283	50	171	47	70160	5757	231	249	231	249	565	53
.	115014	141	51	87	15	38207	25841	397	218	397	218	582	14
.	2884	4	12	1	5	331	144	58	95	58	95	3	1
.	57028	80	12	49	4	23595	16391	303	276	303	276	222	7
ston	140	7	23	12	20	2010	4009	242	178	242	178	265	5
.	46841	82	23	81	8	18416	15987	402	241	402	241	205	25
.	52250	67	9	50	4	19344	12010	63	63	63	63	76	16
.	495	29	3	50	2	76	51	127	178	127	178	205	4
.	108	23	1	8	38	1160	2345	343	206	343	206	204	2
.	29138	42	13	51	111	6386	1788	334	241	334	241	204	20
.	48100	79	15	43	144	10277	12625	173	141	173	141	161	24
.	21871	66	14	43	126	22206	11500	247	236	247	236	178	29
.	39507	73	20	60	100	10907	6873	34	197	34	184	18	15
.	3396	63	5	26	98	20702	17156	245	195	245	195	243	14
.	3135	12	1	27	41	12522	6760	76	109	76	109	14	3
.	38755	81	8	67	158	1857	3105	288	239	288	239	542	13
.	3108	58	1	110	174	14185	16617	101	152	101	152	29	6
.	1084	6	2	181	14	5017	11375	77	109	77	109	14	1
.	128341	200	64	181	470	614	914	288	239	288	239	542	83
.	14253	97	0	43	152	61600	50884	93	255	93	255	53	4
.	5157	22	2	26	51	24256	10558	101	152	101	152	29	1



1

*TABLES shewing the number of Gold Mines worked, the average number of men engaged in mining, the quantity of quartz Raised and Crushed, the average yield per ton, and the total yield of Gold, &c., &c., in the several Gold Districts, as shown by the Statistical Returns of the Deputy Commissioners*

JANUARY, 1872.

DISTRICT.	Number of Mines being worked.	Average No. of men daily employed in mining.	Total number of Quartz Mills in District.	H.P. Steam Power.	H.P. Water Power.	Quartz Raised.		Quartz Crushed.	Yield per Ton.			Maximum yield per ton.			Gold obtained otherwise than from Crusher.			Total yield of Gold.		
						Tons.	Tons.		lb.	wt.	gr.	lb.	wt.	gr.	lb.	wt.	gr.	lb.	wt.	gr.
Stormont.....	2	30	3	1	2	80	18	1	0	20	1	8	.....	.....	.....	18	12	12		
Wine Harbor.....	2	37	5	4	1	288	288	.....	11	06	7	17	.....	.....	.....	161	11	.....		
Sherbrooke .....	11	135	12	9	3	486	486	.....	13	20	2	10	5	.....	.....	336	17	12		
Tangier.....	3	55	4	3	1	60	212	.....	9	23	.....	18	10	.....	.....	105	11	6		
Montagu .....	3	47	2	2	.....	43	43	4	14	21	5	14	8	.....	.....	194	.....	18		
Waverley .....	2	65	4	3	1	72	95	.....	12	04	.....	14	16	.....	.....	57	17	.....		
Oldham.....	12	31	3	1	2	.....	78	1	2	16	2	13	.....	.....	.....	87	18	23		
Renfrew.....	8	27	5	2	3	.....	160	.....	4	15	.....	10	18	.....	.....	36	17	08		
Uniacke.. .....	2	14	4	3	1	121	121	.....	5	3	.....	17	12	.....	.....	31	1	.....		
Caribou.....	2	10	2	1	1	22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		
Unprocl'd. & other Dist's.	1	4	9	5	4	40	40	.....	4	18	.....	04	18	.....	.....	9	10	.....		
Total.....	48	455	53	34	19	1212	1541	.....	13	12	7	17	.....	.....	.....	1039	17	07		



# MARCH, 1872.

DISTRICT.	Number of Mines being worked.	Average No. of men daily employed in Mining.	Total number of Quarts Mills in District.	Do. Steam Power	Do. Water Power	Quartz Raised.	Quartz Crushed.	Yield per Ton.			Maximum yield per Ton.			Gold obtained otherwise than from Crusher.			Total yield of Gold.		
						Tons.	Tons.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.
Stormont.....	2	28	3	1	2	100	1½	3	13	13	3	13	13	.....	.....	.....	5	10	8
Wine Harbor.....	2	29	5	4	1	182	182	...	10	4	1	16	12	.....	.....	.....	93	14	.....
Sherbrooke.....	13	135	12	9	3	531	531	...	12	21	4	01	18	.....	.....	.....	342	06	.....
Tangier.....	4	60	4	3	1	123	226	...	8	20	...	14	04	.....	.....	.....	91	7	20
Montagu.....	4	47	2	2	...	42	45	3	2	19	8	10	18	.....	.....	.....	141	7	.....
Waverley.....	2	50	4	3	1	72	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oldham.....	10	38	3	1	2	72	72	2	6	12	5	6	14	.....	.....	.....	166	13	15
Renfrew.....	6	27	5	2	3	100	48	...	8	16	...	16	15	.....	.....	.....	21	1	6
Uniacke.....	2	12	4	3	1	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Caribou.....	2	10	2	1	1	24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unprocl'd. & other Dist's.	1	7	9	5	4	180	180	...	2	22	...	2	22	.....	.....	.....	26	2	.....
Total.....	48	443	53	34	19	1456	1285½	...	13	20	8	10	18	.....	.....	.....	888	2	1

## APRIL, 1872.

10	3	1	2	24	64	819	17	2	28	2	5
36	5	4	1	205	205	1613	16	13	169	12	...
145	12	9	3	708	708	1203	308	07	430	...	...
17	4	3	1	52	91	00712	19	18	34	13	...
40	2	2	...	55	6	40504	801	...	25	11	...
42	3	2	1	110	110	01214	614	02	69	03	...
23	3	1	2	54	...	05	10	2	13	11	14
7	5	2	3	104	...	0715	8	5	39	13	...
3	4	3	1	35	35	0904	9	4	16	07	...
12	2	1	1	120	10	0303	3	3	18	17	...
8	9	5	4	20	200	0220	0	220	28	9	12
343	62	33	19	1399	1697	1007	801	...	873	19	17

MAY, 1872.

DISTRICTS.	Number of Mines being worked.	Average No. of men daily employed in mining.	Total number of Quartz Mills in District.	Do. Steam Power.	Do. Water Power.	Quartz Raised.		Quartz Crushed.		Total yield of Gold.	
						Tons.	Tons.	Tons.	Tons.		
Stormont.....	1	10	3	1	2	35	.....	.....	.....	.....	.....
Wine Harbor.....	2	38	5	4	1	170	.....	.....	.....	.....	.....
Sherbrooke.....	14	150	12	9	3	472	.....	.....	.....	.....	.....
Tangier.....	4	13	4	3	1	106	*200	.....	.....	.....	.....
Montagu.....	5	40	2	2	.....	55	.....	.....	.....	.....	.....
Waverley.....	2	37	3	2	1	315	.....	.....	.....	.....	.....
Oldham.....	10	30	3	1	2	.....	.....	.....	.....	.....	.....
Renfrew.....	3	12	5	2	3	39	.....	.....	.....	.....	.....
Uniacke.....	3	4	4	3	1	20	.....	.....	.....	.....	.....
Caribon.....	2	8	2	1	1	17	.....	.....	.....	.....	.....
Unprocl'd & other Dist's.	1	7	9	5	4	200	.....	.....	.....	.....	.....
Total.....	47	349	52	33	19	1429	1596	01609	9 619	1226	07 14

\* 100 refuse.

## JUNE, 1872

.....	2	11	3	1	2	75	125	2	13	4	118	.....	252	18	5
rbour.....	2	27	5	4	1	120	.....	.....	.....	.....	.....	.....	.....	.....	.....
ke.....	12	117	12	9	3	322	322	19	03	2	.....	.....	308	02	08
.....	4	38	4	3	1	48	57	10	18	2	18	.....	30	12	06
.....	4	49	2	2	.....	55	39	8	3	13	14	.....	318	18	.....
.....	2	30	3	2	1	103	103	09	19	.....	11	21	50	09	.....
.....	6	19	3	1	2	.....	23	2	4	8	3	.....	51	0	8
.....	2	16	4	2	2	.....	26	4	23	0	4	23	6	9	.....
.....	3	7	4	3	1	26	26	14	10	2	.....	.....	18	10	.....
.....	2	4	2	1	1	10	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	1	9	9	5	4	200	200	2	14	.....	2	14	26	04	.....
i & other Dist's..	1	9	9	5	4	200	200	2	14	.....	2	14	26	04	.....
Total .....	40	327	51	33	18	959	921	103	02	14	.....	.....	1063	03	03

## JULY, 1872.

DISTRICTS.	Number of Mines being worked.	Average No. of men daily employed in Mining	Total number of Quarts Mills in District.	Do. Steam Power.	Do. Water Power.	Quartz Raised. Tons.	Quartz Crushed. Tons.	Yield per Ton.			Maximum yield per Ton.			Gold obtained otherwise than from Crusher.			Total yield of Gold.		
								Oz.	lb.	gr.	Oz.	lb.	gr.	Oz.	lb.	gr.	Oz.	lb.	gr.
								Tons.			Tons.			Tons.			Tons.		
mont.....	1	18	3	1	2	20	.....	1	4	18	.....	6	10	8	.....	.....	.....	.....	.....
e Harbor.....	2	32	5	4	1	213	.....	1	6	4	.....	2	17	.....	.....	.....	492	.....	.....
brooke.....	11	120	12	9	3	259	.....	1	16	07	.....	2	8	04	.....	.....	339	2	12
rier.....	5	23	4	3	1	89	.....	2	18	11	.....	3	9	14	.....	.....	102	15	18
lagu.....	4	50	2	2	.....	46	.....	2	12	09	.....	1	2	05	.....	.....	134	10	.....
erley.....	2	34	3	2	1	163	.....	1	14	8	.....	9	4	18	.....	.....	100	17	.....
am.....	8	27	3	1	2	84	.....	7	2	.....	.....	.....	.....	.....	.....	.....	144	12	9
rew.....	4	19	5	2	3	64	.....	11	18	.....	.....	.....	.....	.....	.....	.....	22	13	.....
cke.....	3	5	4	3	1	38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	13	.....
ou.....	1	5	2	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
oc'd. & other Dist's.	1	8	9	5	4	200	.....	.....	02	16	.....	.....	02	16	.....	.....	26	18	12
Totals.....	42	341	52	33	19	7116	1268	101	15	9	418	.....	.....	.....	.....	.....	1371	02	03



'2.

46	...	14 18	...	14 18	...	...	...	107 15	...
20	1	9 19	1	9 19	...	...	...	328	...
92	...	18 12	1	12 18	...	...	...	460 15	20
22	...	08 23	1	01 19	...	...	...	54 16	19
59	2	17 22	3	2	...	...	...	170 18	...
55	...	14 05	1	...	...	...	...	110 07	...
96	1	5	5	6 4	...	...	...	119 8	...
...	...	...	...	...	...	...	...	...	...
37	...	14 18	8	14 17	...	...	...	65 16	...
39	...	11 11	...	16 17	...	...	...	22 07	12
00	...	02 16	0	02 16	...	...	...	26 14	10
66	...	18 17	9	14 17	...	...	...	1466	18 13

## SEPTEMBER, 1872.

DISTRICTS.	Number of Mines being worked	Average No. of men daily employed in mining	Total number of Quartz Mills in District	Dc. Steam Power	Dc. Water Power	Quartz Raised.	Quartz Crushed	Yield per Ton.			Maximum yield per Ton			Gold obtained otherwise than from Crusher.			Total yield of Gold		
						Tons.	Tons.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.
.....	1	13	3	1	2	21	21	1	5	17	1	5	17	.....	.....	.....	27	.....	.....
our .....	1	23	5	4	1	204	24	.....	2	20	0	5	.....	.....	.....	.....	72	8	1
.....	11	102	12	9	3	376	*876	.....	17	15	1	5	21	31	.....	.....	362	10	20
.....	6	32	4	3	1	73	70	.....	12	18	1	8	4	.....	.....	.....	44	14	8
.....	3	42	2	2	.....	31	31	3	6	05	5	.....	.....	.....	.....	.....	102	13	.....
.....	2	34	3	2	1	141	141	.....	11	16	0	11	17	.....	.....	.....	82	10	.....
.....	6	27	3	1	2	45	45	1	8	7	3	13	18	.....	.....	.....	63	12	2
.....	6	23	5	2	3	88	88	.....	7	16	1	0	14	.....	.....	.....	30	13	.....
.....	4	5	4	3	1	35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	2	7	2	1	1	17	114	.....	13	20	.....	14	14	.....	.....	.....	78	19	18
..... other Dist's.	1	9	9	5	4	300	300	.....	2	.....	.....	2	.....	.....	.....	.....	30	9	08
total .....	43	317	52	33	19	1331	1710	.....	13	15	3	13	18	31	.....	.....	895	10	09

\*500 Tons Tailings re-Crushed.

1500 lbs. from Plates, &amp;c.



## NOVEMBER, 1872.

DISTRICTS.	Number of Mines being worked.	Average No. of men daily em- ployed in mining.	Total number of Quartz Mills in District.	Do. Steam Power.	Do. Water Power.	Quartz Raised.		Quartz Crushed.		Yield per ton.			Maximum yield per ton.			Gold obtained other- wise than from Crusher.			Total yield of Gold.			
						Tons.	Tons.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.			
Stormont.....	1	1	3	1	2	130	230	1	7	23	1	14	4	...	...	...	321	12	13	...	...	...
Wine Harbour.....	1	19	5	4	1	394	394	...	13	13	1	14	3	...	...	...	277	9	12	...	...	...
Sherbrooke.....	10	110	12	9	3	69	82	...	18	08	1	6	9	...	...	...	75	04	...	...	...	...
Tangier.....	6	30	4	3	1	92	92	1	4	6	3	12	...	...	...	...	111	13	...	...	...	...
Montagu.....	2	44	3	3	...	115	115	...	18	16	1	...	8	...	...	...	78	16	16	...	...	...
Waverley.....	2	39	3	2	1	88	88	1	4	10	3	2	18	...	...	...	107	7	...	...	...	...
Oldham.....	8	19	3	1	2	39	39	...	10	4	...	11	...	...	...	...	20	...	...	...	...	...
Renfrew.....	3	15	5	2	3	27	21	...	10	23	...	14	17	...	...	...	11	10	12	...	...	...
Uniacke.....	4	4	4	3	1	15	15	...	3	16	...	5	10	...	...	...	2	15	2	...	...	...
Caribou.....	2	5	2	1	1	880	300	...	2	3	...	2	3	...	...	...	56	10	11	...	...	...
Unproc'd & other Dist's.	4	46	9	5	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total.....	43	332	53	34	19	1299	1376	11	15	11	3	3	12	34	10	10	1062	18	16	...	...	...

\* Crushed sand, washed.



B.

STATEMENT showing the average daily labor employed, the amount of Quartz crushed, "the yield of Gold per ton of Quartz," the Quantities of Gold from Alluvial Mines, the yield of Gold, the maximum yield per ton in each District, and in the whole Province, and the value of the average yield of Gold per man employed in mining for the Twelve Months ending December 31st, 1872.

DISTRICT.	Average men employed.	Crushing Mills employed.	Steam Power.	Water Power.	Quartz, etc. Crushed.	Yield per Ton.	Gold from Alluvial Mines.	Total yield of gold	Maximum yield per Ton.	Average yield per Man for Twelve Months at \$18.50 per oz.
Stormont.....	14	3	1	2	543	.. 17 09	.....	472 00 11	4 01 18	623 71
Wine Harbour.....	28	5	4	1	2309	1 02 06	.....	+2572 10 18	7 17 00	1699 70
Sherbrooke.....	123	12	9	3	5323	.. 15 17	+41 00 00	4188 09 21	4 01 18	628 27
Tangier.....	33	4	3	1	1622*	.. 10 05	.....	829 08 15	2 19 16	464 74
Montagu.....	20	3	3	..	683	2 12 12	.....	1793 10 06	14 00 00	1658 95
Waverley.....	19	3	2	1	1761	.. 11 17	.....	1032 04 00	1 03 18	1004 84
Oldham.....	28	3	1	2	793	1 05 14	.....	1014 10 14	9 04 18	669 96
Renfrew.....	18	5	2	3	855	.. 07 13	.....	323 03 08	2 12 10	332 00
Uniacke.....	6	4	3	1	364	.. 13 07	.....	241 10 00	8 14 17	743 08
Caribou.....	7	2	1	1	368	.. 11 09	.....	209 15 00	2 17 08	552 35
Unproclaimed and other Districts.....	18	9	5	4	2552	.. 02 13	73 11 06	402 00 13	.. 11 13	413 16
	314	53	34	19	17 173	.. 17 13	114 11 06	15079 03 10	14 00 00	888 41

\* 100 Refuse. † 10 oz. from Crushed Sand Washed. ‡ 69 oz. from plates, &c. || 500 Tailings.

## No. 1.

Statement showing the number of Men employed, Quartz crushed, and Gold obtained each Month in each District.

MONTH.	STORMONT.				WINE HARBOR.				SHEERBROOKE.				TANGIER.			
	Men	Quartz	Crushed	Gold	Men	Quartz	Crushed	Gold	Men	Quartz	Crushed	Gold	Men	Quartz	Crushed	Gold
January.....	30	18	18	12	37	288	161	11	185	486	836	17	55	212	105	11 06
February.....	22	...	...	...	27	170	85	...	128	562	860	5	51	287	115	08 07
March.....	28	14	5	10	29	182	98	14	185	531	342	06	60	226	91	07 20
April.....	10	64	28	02	36	205	169	12	145	708	430	...	17	91	84	18 ..
May.....	10	...	...	...	28	170	265	08	150	472	429	06	18	206	28	01 15
June.....	11	125	252	18	27	...	...	...	117	322	308	02	38	57	80	12 06
July.....	18	...	...	...	32	313	492	...	120	259	339	02	28	126	102	15 18
August.....	18	146	107	15	27	220	328	...	115	492	460	15	22	122	54	16 19
September.....	13	21	27	...	23	24	*72	08	102	876	362	10	32	70	44	14 08
October.....	1	...	...	...	25	330	234	4	102	209	238	3	27	72	63	05 18
November.....	1	...	...	...	19	230	321	12	110	394	277	9	30	82	75	04 11
December.....	4	168	32	2	20	177	349	01	112	12	303	10	38	71	82	17 05
Total.....	14	543½	472	00	11	28	...	...	123	5823	4188	09	33	1622	829	08 62

\*69 oz. from plates, &amp;c.

†500 tons tailings.

‡100 refuse.

## No. 2.

Statement showing the number of Men employed, Quartz Crushed, and Gold obtained each Month in each District.

MONTH.	MONTAGU.					OLDHAM.					RENFREW.				
	Men	Quartz	Crushed	Gold	Ounces	Men	Quartz	Crushed	Gold	Ounces	Men	Quartz	Crushed	Gold	Ounces
January.....	47	48	194	00	1	78	87	18	23	27	160	86	17	08	
February.....	50	46	148	14	12	66	89	16	11	27	152	58	19	12	
March.....	47	45	141	07	..	72	166	13	15	27	48	21	01	06	
April.....	40	6	25	11	..	54	13	11	14	7	104	39	13	..	
May.....	40	81	250	07	..	66	49	04	23	12	39	11	02	06	
June.....	49	39	818	18	..	28	51	00	08	16	26	6	9	..	
July.....	50	46	134	10	..	84	144	12	09	19	64	22	13	..	
August.....	48	59	170	18	..	96	119	08	..	15	..	..	..	..	
September.....	42	81	102	13	..	45	63	12	02	23	88	30	18	..	
October.....	46	81	93	6	..	79	74	9	14	19	135	75	15	..	
November.....	44	92	111	13	..	88	107	7	16	15	39	20	..	..	
December.....	34	114	101	12	..	42	46	16	19	11	..	..	..	..	
Total.....	20	683	1793	10	6	793	1014	10	14	18	855	323	08	08	



## No. 3.

*STATEMENT showing the number of men employed, Quartz crushed, and Gold obtained each month in each District.*

MONTH.	UNLACKE.					CARIBOU.					UNPROCLAIMED, &c.				
	Men	Tons	Q	Lb	Lb	Men	Tons	Q	Lb	Lb	Men	Tons	Q	Lb	Lb
January .....	14	121	31	01	.....	10	.....	.....	.....	.....	4	40	9	10	.....
February .....	11	45	30	.....	.....	10	.....	.....	.....	.....	4	100	19	10	.....
March .....	12	.....	.....	.....	.....	10	.....	.....	.....	.....	7	180	26	02	.....
April .....	3	35	16	07	.....	12	120	18	07	.....	8	200	28	09	12
May .....	4	20	17	07	.....	8	27	32	06	.....	7	200	31	01	11
June .....	7	26	18	10	.....	4	.....	.....	.....	.....	9	200	26	04	.....
July .....	5	13	7	13	.....	5	.....	.....	.....	.....	8	200	26	18	12
August .....	3	37	65	16	.....	5	39	22	07	12	9	200	26	14	10
September .....	5	.....	.....	.....	.....	7	114	78	19	18	9	300	30	09	08
October .....	4	37	33	15	.....	4	47	50	3	18	41	300	58	10	10
November .....	4	21	11	10	.....	5	15	2	15	12	46	300	56	10	11
December .....	2	9	9	11	.....	4	6	4	15	12	66	332	62	00	11
Total .....	6	364	241	10	.....	7	368	209	15	00	18	2552	402	00	13



OTHER TIAN GOLD.  
Mines Department for 12 Months ended December 31st, 1872.

RECEIPTS.					EXPENDITURE.				
COUNTIES.	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Return Licenses to Search.	Return Licenses to Work.	Surveys.	Totals.	
Annapolis .....	\$19 47	.....	.....	19 47	.....	.....	.....	.....	.....
Antigonish.....	80 00	.....	.....	80 00	.....	.....	.....	.....	.....
Cumberland.....	2128 32	1409 04	1230 08	4767 44	20 00	.....	300 00	320 00	77
Cape Breton.....	929 06	747 34	33905 27	35581 67	19 47	.....	.....	19 47	.....
Pictou.....	1429 39	271 01	28851 81	30552 21	39 47	.....	.....	39 47	.....
Inverness.....	337 35	48 66	.....	386 01	20 00	48 67	.....	68 67	.....
Colchester.....	338 94	25 00	.....	363 94	20 00	.....	.....	20 00	.....
ings.....	19 47	.....	.....	19 47	19 47	.....	.....	19 47	.....
Hants.....	80 00	.....	.....	80 00	.....	.....	.....	.....	.....
Richmond .....	599 47	125 00	.....	724 47	.....	.....	.....	.....	.....
Victoria.....	118 94	.....	27 17	146 10	.....	.....	.....	.....	.....
Guysborough.....	60 00	.....	.....	60 00	.....	.....	.....	.....	.....
Halifax .....	39 47	.....	.....	39 47	.....	.....	.....	.....	.....
Total.....	\$6179 88	2626 05	64014 32	72820 25	138 41	48 67	300 00	488 07	

## STATEMENT

**RECEIPTS and EXPENDITURE for Twelve Months ended December 31st 1872.**

[illegible]





PROVINCIAE MUSEUM.

,

.

.

.





# REPORT

ON THE

## PROVINCIAL MUSEUM.

---

PROVINCIAL MUSEUM,

February 6th, 1873.

SIR,—I have the honor to submit the following Report on the Provincial Museum under my charge.

In my Report of last year, I gave the classification of the objects displayed in the Museum, and a description of the more prominent specimens.

In the present Report I propose to notice the principal additions that have since been made, arranging them according to the order I then adopted.

### ECONOMIC MINERALS.

A block of Granite from Shelburne, presented by Captain McLean.

A block of Gypsum from Arichat, C. B., presented by Mr. W. Clough.

Two blocks of Limestone from George's River, C.B., presented by Sheriff Bell.

A collection of Cape Breton Marbles.

A collection of specimens of Auriferous Quartz from Isaac's Harbor, presented by the Hon. Wm. Annand.

Iron Ore from Londonderry, Nictaux and Annapolis.

The late Mr. A. P. Ross, of Pictou, presented a large slab of Copper Ore from Tilt Cove and a block of Bituminous Coal from George's Bay in Newfoundland.

To the Department of

## SCIENTIFIC MINERALOGY

have been added,—

*Asphalt*, from the Dead Sea, presented by Mr. H. Bland, Berkshire, England.

*ANDALUSITE* var. *Chiastolite*.

*Tourmaline*.

*Tantalite*.

*Limonite*.

*Meteoric Iron*, from the Desert of Atacama in Bolivia, presented by Mr. H. Bland, Berkshire, England.

*Manganite*.

*Nickel*.

*Bismuth*.

*Copper ores*.

*Silver ore*, presented by Mr. H. S. Poole.

## GEOLOGY.

To the Rock Collection I have added 122 specimens from George's River, C. B.; Arisaig, and Halifax and its environs. N. S. These were collected during surveys

## PALÆONTOLOGY.

A collection of Silurian Fossils from Arisaig.

A collection of Lower Carboniferous Limestone Fossils from N. S. and C. B.

A large collection of Carboniferous Fossils from the North Joggins.

A collection of English Oolitic Fossils presented by Dr. Clay.

Mr. Harris, Artist, P. E. I., presented two large and beautifully executed figures of the *Megatherium* and *Mammoth*.

This Department has been greatly enriched by the generous donation made by Mr. H. Poole, of his valuable collection of Fossils from Nova Scotia, Cape Breton, and other countries.

At the meeting of the Institute of Natural Science, Mr. Poole stated that this collection contained many rare and valuable specimens of Fossils of the Coal Formation, that Mr. Selwyn, Director of the Geological Survey, had solicited the collection to be described by Dr. Dawson among the decades of the survey. Mr. Poole, however, preferred to deposit them in the Museum, where they would be accessible to the members of the Institute and Students of Geology in Nova Scotia. He considered that the Museum in the Capital of the Province whose natural history they tended to illustrate was the proper place of their destination.

In the Botanical Department, the additions made are chiefly foreign.

A fine specimen of Manilla Hemp, presented by Mr. Wm. Stairs.

A section of the Bark of the Mammoth Pine of California, presented by Mr. George Thompson.

The top of a gigantic Reed from the shores of the Dead Sea, presented by Mr. H. Poole.

## IN ZOOLOGY.

Human anatomy has had important additions by the presentations of Dr. Page, and the skull of a Mic-Mac, presented by Dr. Weeks.

There have been added to the Mammals,—

The Star-Nosed Mole—*Condylura cristata*.

A fine specimen of the Wild Cat, *Lynx rufus*—male.

The foetus of a Porcupine, *Erethizon dorsatus*, presented by Mr John Dalton.

Porpoise, *Phocena communis*—in a jar.

Mr. Edward Binney presented a noble pair of Ox Horns from the Cape of Good Hope.

Hon. D. Macdonald a noble pair of Moose Antlers from Antigonish.

Mr. Thomas, a White Musquash Skin.

## BIRDS.

Mr. Egan presented a fine specimen of the English Raven.

Skin of Emu presented by the Hon. D. Macdonald.

Two Skins of Albatross presented by Captain G. W. Clarke.

A Skin of the Chinese King-Fisher presented by Mr. John Graham Amoy.

In the Class,—

H. E. Sir Hastings Doyle, Dr. Gilpin, Mr. Poole, and Capt. G. Clarke, were the principal contributors.

In the Class,—

### FISHES.

A Young American Angler—*Lophius Americanus*, wet preparation. A Sea Trout—*Salmo Canadensis*, weight 7½ pounds, presented by Mr. Payzant.

Dog Fish, old and young.

Foreign—A very young Flying-Fish and a Sea Horse—*Hippocampus*, presented by Capt. C. H. Campbell.

A very large Cow Fish, presented by Dr. Griffiths, H. M. Royal Alfred.

In the next sub-kingdom—

### MOLLUSCA

there are many additions.

Mr. Edward Binney presented a collection of shells containing a large number of specimens.

### MOLLUSCOIDA

have also had additions.

The sub-kingdom

### ANNULOSA

Has had the addition of a very large *Lobster*, *Crabs*, *Shrimps* and *Parasites* from the mouths of Flying-Fishes, presented by Capt. J. H. Campbell.

*Scorpions*, *Centipedes*, *Tarantulas*, *Beetles*, from India and Brazil, also *Locusts*, *Butterflies*, and *Moths*.

## INSECT ARCHITECTURE.

A beautifully constructed nest of *Mygale Cœmentaria* from California, presented by Mr. George Thompson.  
The Sub-kingdom

## ANNULOIDA.

A medusa-head Star Fishes, *Asterophyton* from Margaree, C. B., presented by Mr. Grant, Sydney, C. B.

A large and beautiful *Echinus* from Nassau, presented by Lieut.-Colonel Jolliffe, H. M. S. Royal Alfred.

A large collection of *Echinarachnis* from Cole Harbor, presented by Miss Isabella Fairbanks.

A large collection of Star Fishes, large and small, some with 6 rays.

The Sub-kingdom

## CŒLEENTERATA.

Corals from the West Indies and a beautiful specimen of *Nulliporea*. Coral from Labrador, lat. 54° N., presented by Mr. J. M. Mackay.

*Sertularidæ*, various species.

The Sub-kingdom—

## PROTOZOA

*Sponges* from Halifax Harbor, presented by Mr. J. M. Jones.

A very beautiful group of Tubular Sponges attached to a *Spondylus princeps*, taken off Cadiz, presented by Capt J. H. Campbell.

Abundance of *Foramenifera* attached to *Chiton*, *Sertulariæ*, &c.

The Zoological Collection is now amply sufficient to illustrate any course of lectures on Zoology.

## THE ETHNOLOGICAL DEPARTMENT

has received additions.

Two New Zealand War Clubs, presented by the late A. P. Ross, Esq.

A South Sea Island War Club, presented by Capt. Graham, R. A.

A Weapon armed with Sharks Teeth, presented by Mr. E. Binney.

Embroidery, Printing and Carving from China, presented by Mr. John Graham, Amoy.

Feather Tippet from India, presented by Miss Carrie Ham.

Three Arabian Horse Shoes from Jerusalem, presented by Mr. H. Poole.

A Mandingo War Cap, presented by Mr. Albert Payne.

Jewish Phylacteries from Poland, and a Needle Gun, presented by Mr. H. S. Poole.

## IN THE DEPARTMENT OF ANTIQUITIES

There have been added—Stone Axes, Arrow Heads and a Stone Pipe—the pipe came from River Dennis, C. B. A number of the arrow heads were presented by the late Hon. Wm. Garvie.

A singular specimen is from Newfoundland, T. J. Esq.

From Louisburg Harbor there is the Chain Plate of a French Frigate, presented by Mr. Daniel Cronan.

There is also a Medal struck in commemoration of the Siege of Louisburg, having the effigies of Admiral Boscawen, dated 1758, presented by Mr. Hamilton, of New York, a plan of Louisburg, Harbor and Fortifications, dated 1758, presented by the Rev. Dr. Hannan.

Among the curiosities added there is a pistol which belonged to Mr. William Cobbit, M. P., presented by Mr. Ratchford. A picture of the Great Pyramid, presented by His Excellency Sir Hastings Doyle.

#### IN THE DEPARTMENT OF NUMMISMATOLOGY,&c,

There have been added many Coins, Ancient Roman, Modern European, Asiatic and American—Paper Currency of the Colonies before the Revolution.

A Quebec Assignat of 1758, presented by Mr. Gilbert Seaman, Minudie and Assignats of the French Republic.

There is also an Antique Gem with the figures of Cupid and Aphrodite, found at Jaffa, presented by Mr. H. Poole.

Of Nova Scotia manufacture there is a collection of Axes, presented by Messrs. Bill and McKay, Liverpool.

#### FINE ARTS.

Two old Italian Paintings, presented by the late Hon. Wm. Garvie, and a Bust of H. R. H. Prince Albert, presented by Stephen & Son. A portrait of His Excellency Sir Hastings Doyle.

#### NAVAL ARCHITECTURE.

Model of a Ship, presented by Captain Ryerson, M. P. P.

#### LIBRARY.

A number of volumes have been added.

The Zæmonial copy of Jury Awards of London Exhibition presented by A. M. Uniacke, Esq.



Rapport sur L'Exposition Universelle de 1867, at Paris, presented by the Imperial Commission.

Any report of progress that can be made, cannot but fail to convey any adequate idea of the character and extent of our Museum. It must be visited, examined and studied, in order to be adequately appreciated.

It is evident to every one at a glance, that our Museum Collection is large and varied. It requires frequent visits, close examination and varied knowledge to realize its richness.

Yet the Museum is very far from realizing the aims and expectations of its promoters. Greater accommodation will be required for a proper and adequate display of our mineral resources. A proper appreciation of the utility of securing such a display and an honorable fulfillment of promises made to contribute specimens are necessary for the gaining of the object contemplated.

It was also intended to make the Museum a School of Mines. The collections in the Museum are admirably adapted for this purpose. Already public opinion has assented to our view, in reference to the establishment of such an institution, and it requires only the assent of the Legislature to confirm them. Science classes have already been established, and are now in their third session. In the first session there were 8 students; in the second, 11; This session there are 23 students, of these 22 attend the Geological Class, and 23 that of Zoology and Palæontology. In these classes the instruction given is to a large extent special, i. e., relating to Nova Scotia and Cape Breton.

Several of the gentlemen who attended my lectures last session assisted me in field work, especially in my survey of Halifax and its environs.

The Institute of Natural Science continues to hold its meetings in the Museum with mutual benefit to both Institutions and to the cause of Physical Science in Nova Scotia.

The Provincial Museum is no longer a novelty. It is

four years and a half since it was established. Its popularity is still increasing and the influx of visitors is steady. I have no means of ascertaining the number of visitors that have been admitted during the past year. The number has unquestionably been very considerable. Town and country have each contributed their quota, and a great proportion have been strangers.

Assured that you will take as deep an interest in the prosperity and success of our institution as your two predecessors in office.

I have the honor to be,

Your obedient servant,

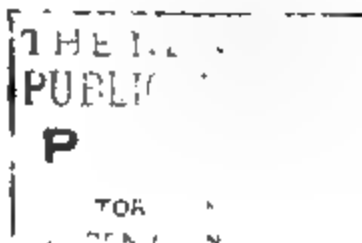
D. HONEYMAN, D.C.L.

Director.

The Hon. D. Macdonald,  
Chief Commissioner of Mines.

# REPORT

OF THE



★ DEPARTMENT OF MINES,

NOVA SCOTIA.

FOR THE YEAR 1873.

---

HALIFAX, N. S.

PRINTED BY THE CITIZEN PUBLISHING COMPANY

1874.

VH:57



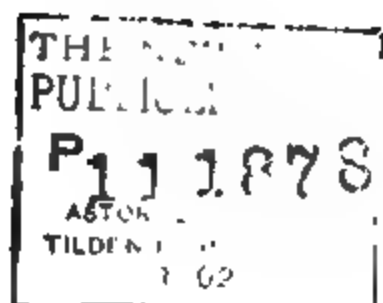
**REPORT**  
**OF THE**  
**DEPARTMENT OF MINES,**  
**NOVA SCOTIA.**

**FOR THE YEAR 1873.**

---

**HALIFAX, N. S. :**  
**PRINTED BY THE CITIZEN PUBLISHING COMPANY.**

1874,  
ANB



# CONTENTS.

	PAGE.
Introduction.....	
General Summary.....	2
Prospects.....	3
Prospecting.....	3
Dynamite and Drilling Machines.....	4
Barriers and Plans.....	5
Weighing.....	6
Special Rules.....	8
Certificated Managers.....	11
Coal.—Cumberland County.....	13
Pictou County.....	15
Drummond Colliery.....	17
Cape Breton County.....	20
Inverness County.....	24
Victoria County.....	26
Richmond County.....	26
Hants County.....	27
Guysboro' County.....	27
Gold Mining.....	28
Districts.....	29
Iron Mining.....	34
Copper and other Minerals.....	35
Accidents.....	36
Table of Fatal Accidents.....	37
Drummond Colliery Explosion.....	39
Colliery Accident Fund.....	51
List of Leases and Lessees.....	54
Tables.—Coal. General Statement.....	58
Coal Trade by Counties.....	59
Colliery Production.....	61
Total Production; 1827 to 1873.....	62
Coal Exports (Custom House Reports) Nova Scotia..	63
“ “ and Imports of United States.....	64
“ “ “ Great Britain.....	65
Colliery labor, average production, &c....	66
“ Construction account.....	67
Gold—Monthly abstract.....	68
Yearly abstract.....	68
District Returns.....	80
Plaster, Freestone, &c..	84
Department Accounts.....	85
Drummond Colliery Relief Fund.....	88





DEPARTMENT OF MINES,  
Halifax, January, 31st, 1874.

SIR,—

The undersigned has the honor of forwarding to you the Report of the Inspector of Mines relative to the Mines of Nova Scotia, for the year 1873, for the consideration of His Honor the Lieutenant Governor.

D. MACDONALD,  
*Commissioner of Public Works & Mines,*

Hon. W. B. VAIL,  
Provincial Secretary, Halifax.



**REPORT**  
**ON THE**  
**INSPECTION OF MINES,**  
**UNDER LEASE FROM THE CROWN.**  
**IN THE**  
**PROVINCE OF NOVA SCOTIA,**

For the Year ended 31st December, 1873,—By HENRY S. POOLE, F.G.S.;  
ASSOCIATE OF THE ROYAL SCHOOL OF MINES.

---

HALIFAX, January, 1874.

SIR,—In the following report which I have the honor to transmit, I have added, beside the customary references to the present condition of the mining industry in the Province, certain suggestions for your consideration regarding matters which generally affect the working of Crown property. Most of these are in connexion with the Act for the Regulation of Mines which the Legislature last session enacted to come in force with the present year ; and a few bear on the practice of mining in other countries and the recommendation they have for our attention.

Some of the statements hitherto scattered throughout the body of the report are collected in the form of a table and placed in the Appendix. Information respecting the several coal areas held by

lessees, the names of lessees, the names of their agents, the extent of the areas held, &c., is for the first time published. Tables of the coal trade of Great Britain and the United States are also given for comparison, that our exporters may readily see which markets are open to our competition. It will be observed that while the United States export into Canada 428,455 tons they import from us but 264,760 tons. The details of our trade are given in the appended tables, and although the information stated is in a more abstract form than hitherto, I trust it will be found to contain all that is required, and be useful for comparing the extent of the trade with that of other countries.

**GENERAL SUMMARY OF THE RETURNS OF THE MINERAL PRODUCE  
OF NOVA SCOTIA, RECEIVED BY THE DEPARTMENT OF MINES,  
1873.**

Number of Mines	Minerals.	Quantities.	Value.
28	Coal.....'.....tons	1,051,467	\$2,699,347
33	Gold (17708 tons quartz,).....oz.	11,852.4	219,270
3	Iron.....tons.	3,485	10,455
	Plaster..... " "	120,693	120,693
	Freestone..... " "	2,820	34,532
	Moulding Sand..... " "	130	110
	Plumbaginous Shale..... " "	11	110

The active demand for coal which sprang up in the autumn of 1872 was immediately renewed on the opening of navigation and was maintained until late in the year. Even in August, when there is usually a slackness of trade, the demand remained as great as before and prices continued to rise as contracts previously made became filled. The best qualities of screened coal which a year before were selling, free on board, at \$2.25 per ton with a discount of 10 per cent., sold at the close of the season at \$3.25 to \$3.50 per ton; other varieties of coal, less in demand, at rates ranging downward to \$2.50 per ton. The total produce of the country amounted to 1,051,467 tons, an increase of 170,517 tons over that of the previous year. The trade was increased by 95,198 tons, 12 per cent.; the sales amounting to 881,106 tons. Though still of no grand proportions its comparatively prosperous condition is shown in the following tabular statement.

	Produce.	Sales.	Royalty.
1871.....	Tons 673,242.....	596,416.....	\$52,846.65
1872.....	" 880,950.....	785,914.....	69,722.69
1873.....	" 1,051,467....	881,106.....	78,874.36

**PROSPECTS.**—The prospects for the present year are good, for a ready demand is generally anticipated. Possibly the output may be as much as 1,250,000. It is not likely, however, to exceed this quantity, even if the demand is greater, for the capacity of most of the collieries is limited and cannot readily be expanded without a further outlay, which operators who invested during the dull times and have had to wait so long for dividends, are naturally averse to make. The great demand for coal and the remunerative prices obtained for all the established collieries caused many enquiries to be made by promoters of mining speculations for property in the Province, but up to the present time no scheme that may have been set on foot has yet taken tangible shape. Although the attention of capitalists has been drawn to the undeveloped property of the Crown, they have been largely deterred from embarking in fresh schemes by the heavy expenditure known to have been incurred at many of the existing establishments, where it had been found necessary to supplement the sums of money actually required to develop the mines by large outlays on railways, artificial harbors, and shipping wharves. The country having been to some extent opened up by these expenditures, facilities may now be acquired in certain localities by less pretentious concerns for coal mining on a moderate capital.

**PROSPECTING.**—Much attention was given during the year to prospecting for all minerals expected to occur in the Province, the labor expended being more particularly directed to the discovery and extension of seams of coal and beds of iron ore. An unusual number of licenses to search and work were taken out, and by the end of the year, with those previously granted and still in force, ground was covered by applications of the various denominations to the following extent: First rights of Search 313; Second, 111; Third, 50; Fourth, 23; Fifth, 7; Licenses to Work, 95: in all covering an area of 1565 square miles. Applications were taken out most numerous in the following named counties in the order of their priority; Cumberland, Pictou, Cape Breton, Inverness, Colchester, Richmond and Antigonish.

What the results of the prospecting, in the several localities mentioned have been, I am but in few cases able to state, as few reports of the explorations were made to the Department as required by the terms of Licenses; in most cases because the licensees have made no discoveries and consider they have no information to transmit, or are 'middlemen' who have done no work; in some, because ignorant of the kind of information required, and in a few, because the licensees fear advantage may be taken by persons holding contiguous areas, of any information they may impart. The value of this last excuse is altogether imaginary, for the rights of licensees are well protected; but to facilitate the making of the required reports of exploration it might be advisable to supply a form of Return to accompany the license.

**DYNAMITE.**—In the last report reference was made to the advantages accruing in other countries from the use of powerful explosives for blasting, and to the probable benefit to be derived in this by the introduction of dynamite. It was expected that a supply could be obtained from England and a trial made in the gold mines and in colliery sinkings, but on further enquiry it was found that the new regulations respecting its transportation recently issued by the Home Office, threw insuperable obstacles in the way of its importation. The previously existing restrictions were imposed when dynamite was little understood and thought to be akin in its dangerous qualities to nitro-glycerine, and the new regulations were made, it was expected for the purpose of removing instead of augmenting the legal obstructions thrown in the way of its introduction into general use. Instead of doing so they are practically prohibitory of its exportation, and causing, as they do, so much annoyance to the miners and quarrymen using it in England, have produced an outcry which has extracted a half promise that they will shortly be entirely removed. As we must for the present rely on foreign countries for our supply, since the Dualin, a somewhat similar material manufactured in the Dominion, has not so far given satisfaction, it is to be hoped that this will be done. Closely connected with the use of powerful explosives is that of

**DRILLING MACHINES.**—Abroad a great deal of attention is now



bestowed on the invention of and perfecting machines already invented to substitute for the slow and expensive method of drilling by hand. Much success has already attended the use of rock drilling machines in undertakings of magnitude where time is the great element of consideration. For boring holes to prove the nature of underlying strata the Diamond Drill stands unrivalled, since in its operation it is more expeditious, cheaper and satisfactory than any system yet invented. In the sister Province of New Brunswick two such drills are in use—one owned by the Government exploring for coal at Grand Lake, and the other in the hands of Mr. Bligh searching for the continuation of the celebrated vein of Albertite near Hillsborough. Mr. Bligh has handled his machine with great success as regards the boring, having put down—so far as I can learn—the deepest hole yet made by a drill of this kind. His boring reached a total depth of 1040 feet.

What is now more particularly wanted is a cheap, simple and efficient machine that can be readily applied to the ordinary work of a mine, sinking and drifting. More particularly do we require such an apparatus in our gold mines, where the successful adoption, attended by economy of time and labour, would enable mines now lying idle, or merely paying working expenses, to yield a handsome profit. Many machines invented for this purpose have met with considerable success. For soft bituminous shales the McDermott handborer has been found most serviceable. For border rocks, the McKeen and Burleigh Drills have proved efficacious, but will be surpassed, it is expected, by a new borer called the Kainotomon, which lately tested, has received a practical approval in Cornwall.





a wrong impression was produced as to the object of the clauses. The subject seemed to me of sufficient importance to bring it to your notice in my report, and I did so, but briefly, hoping that those interested would acquiesce in the justice of my suggestion and not raise an opposition that might make it necessary to investigate and expose previous shortcomings and inaccuracies. As, however, they thought otherwise, I may, without bringing a direct charge against any one, be more explicit. The terms of the leases distinctly state that the royalty shall be so much per ton, and that ton to weigh 2240 lbs. Several of the companies and their agents accepted the terms literally, and called my attention to the practice of others who did not, as they did, weigh all the coal they sold. Others were in the habit of averaging the quantity and I have no reason to believe otherwise than fairly, while some roughly guessing at the amount, took care to allow a sufficient margin for loss.

It was to put all on the same footing and to do justice to those who, sending accurate returns, considered it but fair to them and the Crown, that all in like positions should be required to weigh all coal paying royalty. It was argued that it was absurd to say that the owners, to save seven or eight dollars royalty, would give away seventy or eighty tons of coal, the impression being that the Quarterly Returns sent to the Department, were made on the quantities actually sold and paid for. Such, however, has not always been the practise, for in some cases the returns have been made by colliery officials who never saw the sales account kept at the head office of the company, it may be, in some principal and distant city. To the company it is of no consequence what amount the colliery charges the head office with, so long as it is under the quantity actually received. The royalty has thus been paid on the total quantities compiled from the several amounts stated on the bills of lading, which in known instances have been 70 tons short on a cargo of 900 tons and 30 tons on a cargo of 400. To the shipmaster as a rule, it matters not what the quantity invoiced be, for the freight is made payable on the amount delivered, his bill of lading being made out so many tons more or less.

Last year I was not in a position to know that any owner or agent had previously sent either intentionally or through negligence

sworn returns which were inaccurate, but I am now prepared to show that the Returns on a large out-put for the year 1872 from one concern were 20 p. c. incorrect ; and I have the best authority for stating that the returns of another were not within 5 p. c. of the quantity sold.

As I before remarked, had custom sanctioned a uniform discount which was recognized and acted on by all without any distinction, I should not have regarded the question of so much importance or considered it necessary to do more than report the practice of such discount but as I believe it is one more between lessee and lessee than between the Crown and the lessees, I feel justified in writing thus plainly.

It must be acknowledged that some companies would be put to the additional expense of erecting proper weighing scales, but their complaints of the hardship of complying with this requirement should have little weight when it is due to their own mismanagement that they are unable to comply with the terms of their leases. The objection 'that grievous detention would be caused when the business is large' is one that it appears to me a practical man should hesitate to raise. What is done at a thousand collieries in England and at some of our mines, can surely be also done at every other well regulated colliery in this country. While I am still of opinion that where the business is large every ton should be weighed, I at the same time think it might be advisable to have the following proviso attached to the section. Provided that where the output of any mine to which this section applies is irregular and written representations are made to the Commissioner that by reason of the temporary character of the arrangements at the mine, or the smallness of the output, the lessee would be subjected to great inconvenience and expense by strictly complying with the provisions of this section, then the Commissioner may, if the Inspector is satisfied that the lessee has adopted a reasonable satisfactory system of estimating the weight of the mineral by measurement or by averaging, grant, if he think fit, an extension of time for complying with the provisions of this section.

**SPECIAL RULES** —An important decision was recently given in England relative to the liability of colliery owners for the defa

of their servants under the Mines Regulation Act, 1872. This decision is of interest to owners and managers in this country, for it turns on the wording of a certain clause of the Act which is identical with a similar clause in the Mines Regulation Chapter of the Revised Statutes of this Province.

One of the General Rules having been broken, an action was brought against the owner, who, it appears had made Special Rules under the Act and had properly appointed subordinates to carry out the provisions of those Rules. After summing up the evidence, the judges stated in their decision:—That the colliery owners, however, are not liable where all ordinary precautions are taken for any negligence, we think, is sufficiently shewn by the last paragraph of the “General Rules” by which it is provided that, “in the event of any contravention or non-compliance with any of the said General Rules in the case of any mine to which this Act applies by any person whomsoever being proved, the owner, agent and manager shall each be guilty of an offence against this Act, *unless he prove that he had taken all reasonable means*, by publishing, and to the best of his power enforcing, the said rules and regulations for the working of the mine to prevent such contravention or non-compliance.” Therefore having employed properly qualified persons to fill certain positions, defined their duties, and enforced in every way the rules and regulations for the working of a colliery, it is evident that the liability of the owner and manager ceases and responsibility rests with those who, by negligence, commit an error interfering in any way with the safety of the workmen.

This decision, exonerating the owner who has made Special Rules, clearly leaves him amenable where he has not done so, and a General Rule is broken by servants on whom no responsibility is made to rest. Hence, the necessity for owners and managers establishing Special Rules in order to relieve their own shoulders of as much of the burden imposed by the Act as the Act will allow, and impose the due share of responsibility on those in subordinate positions in whose hands, to a large extent, rest the safety of their own lives and the lives of the working men.

But fatalities also occur and accidents are caused by the want

of discipline not directly required by the Chapter and not readily made controllable by general rules but easily so by special rules made suitable to the peculiar requirements of the particular colliery they are intended to govern. At the present time, some of our best regulated mines have been alone managed by verbal rules—in some with good effect—but as it is impossible to maintain discipline as strictly as is often advisable on account of the difficulty of imposing or rather of enforcing penalties not legally imposed, the advantages of special rules legally constituted are very apparent.

To instance a case not directly governed by the General Rules of the Chapter, but which occurring in England would have been controlled by Special Rules, I will here notice in detail the occurrence of an accident at the Vale colliery on the 22nd of November.—On the evening of that day, two countrymen, strangers to the mine, appeared on the “bankhead” and asked permission to visit some friends of theirs who were below. It is said that the Banksman demurred at first but finally permitted them to go down. They remained below for some time and on returning were accompanied by one Daniel McDonald, a young man about twenty years of age, who undertook to see them to the surface. On arriving at the bottom of the slope they found the trolly loaded with coal and jumping on it one of them gave the signal to hoist. The trip started and when about 400 feet up the slope—which is very steep—the drawbar bolt broke and the trolly with its load rapidly descended to the bottom. McDonald was instantly killed, Wm. Hendrickson so seriously injured that he died in a few days and Andrew Walsh got his leg broken, and was otherwise injured.

Now it is generally understood in this country and is an established special rule in England, that the Banksmen and Onsetters in charge of shafts and steep inclines are not to allow any person to descend or ascend without permission from the proper authorities nor to allow any one to ride with full tubs. Here, then, was manifest breach of good discipline attended by disastrous result and it appears to me, that this one case alone, is sufficient to show why special rules should be framed to make those in the position of Banksmen and Onsetters, responsible to the extent of the duties.



**CERTIFICATED MANAGERS.**—The products of the mine being either absolutely or practically limited in quantity, once extracted cannot be reproduced by cultivation as the products of the soil ; they should therefore be regarded as property held in trust by the present for the public benefit of this and future generations, and should with watchfulness be protected from waste and lavish consumption. Though there is a natural tendency for all corporations holding but temporary lease of such property to endeavor to reap as speedily as may be the largest present gain, without respecting the true welfare of the property they hold, we cannot yet complain of a lavish expenditure of our mineral products, but we can of wastefulness connected with the management of many undertakings. Without any exaggeration it can be said that large sums of money have been uselessly expended on the developement of our mineral resources while yet the business is comparatively insignificant. In referring to this waste it is not advocated that it could for the future be entirely prevented by the employment of certificated managers, but the advantage to the country and to the lessees of Crown property to be derived from the employment of thoroughly efficient men is only too apparent to capitalists and others familiar with the past history of our mining enterprises.

It has been deemed expedient in this country that the law should interfere and require that the masters and mates in charge of our marine shall be men in whom trust can be placed, men who by practical experience and professional education, are, up to a certain standard, fitted to fill the positions they occupy. If this then has been considered necessary, where the property concerned is not directly owned by the Crown, how much more should some prudent supervision be exercised in the case of our mines, which are ?

In England where the mineral rights are held by private owners the law requires a certificated manager to be in charge of every mine, and although there has been a good deal of doubt expressed as to the thoroughness of the present system of granting certificates there adopted, it is evidently a move in the right direction, and naturally suggests a similar movement in other mining countries. Since the law has been in force and an opportunity given to observe its working, it has been suggested by some of the Prize Essayists writing "On the Prevention of Catastrophes in Mines" that it



would be an improvement were all colliery officials required to possess certificates, not only the manager or chief person in authority, but also that the overmen, deputies, and firemen, should be required to possess certificates of 1st, 2nd or 3rd class according to the positions they hold. There can be no doubt but that men in such positions as deputies and firemen should have that amount of book learning essential for the proper performance of their duties. An efficient fireman should be able to say why fire damp collects near the roof and choke damp near the pavement, and explain how atmospheric changes of temperature and pressure affect mines, and increase or check the outflow of gases from the measures. Few can do so; but were it made compulsory by law that after the lapse of a certain number of years all officials should hold certificates of competency, obtained by passing examinations on mining matters relating to their special duties, we might then hope that great improvements would take place in the safety of our mines.

Certificates of service might be granted to all officials who have held their positions for one year previous to the commencement of the regulation; which certificates should be only of service so long as the holders remained at the mines in which they were at the time of the granting of the certificates.

There are many among the working miners, who, possessed of the requisite natural ability and determination to succeed, would strive to improve their position, by strenuous efforts in their spare hours, did they have before them the inducement to supply their lack of early education, which the opportunity to earn certificates of competency would hold out to them. There are men now holding responsible positions at some of our mines, who have made their way by the determined exercise of their natural energy of character, and the success that has crowned their efforts, should give much weight to any opinion they may form on this subject, and I believe their opinion is generally in favor of such a scheme as is shadowed forth above. While there are few men possessed of the indomitable pluck requisite to induce them to strive against years of discouragement, there are many of natural ability who would, could they work their way by easy stages, gaining well defined positions of advancement as they strove, be induced to improve their leisure time and endeavor to fit themselves for positions of trust and greater emolument. Were such an opportunity given, then would the general standard of education in the mining community be elevated and the moral tone improved.



## COAL MINING.

---

### CUMBERLAND COUNTY.

---

The attention of the public, which for some years has been directed to the coal field of this County, was more effectually called, during the past year, to the many advantages it possesses. The actual produce, though small, was comparatively a large increase, and the active preparations now in progress warrant expectations of a continued proportionate increase for this and future years.

Important additions to our knowledge of the resources of the Spring Hill District have been made. The Black or Eleven feet seam, has been proved to the Westward, to lie in a straight line as far as Miller's Hotel, where it bends somewhat suddenly round to the Southward. The continuation appears to be further deflected until at a distance of about one mile from the Spring Hill Colliery, it, or a seam very similar in character, is found trending still more to the Eastward and with a Southerly dip. Should subsequent explorations prove the correctness of this surmise, and determine the lay of the seam, untroubled by serious faults, a rapid developement of the coal trade in this county may be anticipated. The thirteen feet seam, originally discovered on the General Mining Association's property, has been proved to be an overlying seam, but has not yet been traced beyond the bend.

By these discoveries the prospective value of the contiguous areas owned by Mr. Livesey and others, on which much money has been spent in surface explorations, has been greatly enhanced and stimulus given to further exploration.

In anticipation of the facilities for transit which the trade of this county must require when the collieries now being started are fully developed, and when the output exceeds the local demand

along the line of the Intercolonial Railway, (as it must shortly do) a Company has already begun to build a Railway from Spring Hill to Parrsboro'. By this branch road the mines will be put into communication with tide water at the nearest and most convenient point for shipment, and the operators be enabled to compete in the markets of New England, at present chiefly supplied from Cape Breton. Analyses of the Coal, making it highly bituminous, warrant the expectation that it will be found suitable for gas making, for which purpose about two million tons are annually required in the towns of New England favorably situated for supplianee from the coast. The quantity at present provided for this purpose by Nova Scotia is somewhat under a quarter of a million of tons.

### COLLIERIES.

**JOGGINS.**—The changes made in the system of working and the facilities for increasing the production, mentioned in the last report, enabled this colliery to greatly extend its business during the past season. Two new incline roads worked by counterbalances have facilitated the transportation underground. The system of 'long-wall' adopted in one district of the workings has been proved well adapted to the requirements of the seam and will be extended to other portions of the workings as circumstances allow.

**SCOTIA.**—The business of this colliery is altogether local and is consequently small. The coal now mined is from the second seam 4' 3" in thickness, and underlying the main seam, which is 2' 9" in thickness, about ten feet. The slope which is 300 feet deep, dips at an angle of 38°

**SPRING HILL.**—The crop openings used in 1872 for the extraction of coal were abandoned and slopes to the East and West, three quarters of a mile apart have been started. The West slope has been driven some 400 feet and the requisite pumping and winding machinery erected. The engine is a single 16 in cylinder with a 4 feet 6 inch stroke, geared three to one, driving a 9 feet drum. Engines of a heavier class and more permanent character are in course of erection at the East slope, where in future the principal output is expected to be made. The ventilation of the present workings is effected by a furnace 6 feet wide erected at the outcrop. Twenty houses, each of two tenements, have been built for the accommodation of the workmen.





## PICTOU COUNTY.

---

The bright prospects with which the coal trade of this County opened, were early marred by strikes, and later in the spring, the lamentable explosion at the Drummond colliery, destroyed all the hopes of the output exceeding that of the previous year. The falling off amounted to 38,767 tons, and the sale decreased 54,433 tons.

Much attention was given to prospecting, and explorations were extensively made in various parts of the county. At Caribou Island much interest was caused by the discovery of a seam which by the outcrop promised to be some four feet in thickness, but which subsequent operations failed to realize. The seam appears to be faulted where struck, and where it is regular, it has not yet been opened. Outside the well known field the explorations were attended with but indifferent success.

A Company has been formed with the intention of proving, if possible, the measures lying north of the New Glasgow Conglomerate. A borehole has been put down 500 feet at Sutherland's Point, and shales, very similar in appearance to those of the coal bearing basin to the south, have been reached. The encouragement thus given will, it is hoped, induce the Company to proceed in their investigation and continue the boring for another 500 or 1000 feet. The value of such an undertaking, in the event of its being successful, cannot be over-estimated, for as the measures lie regular and but slightly inclined, a large tract of country would in all probability be proved by the one operation.

### COLLIERIES.

**ALBION MINES.**—The General Mining Association have transferred this property with all their rights, leases, and real estate, in the county to the Halifax Company (Limited) who have since carried on the operations under the same management.

In the deep seam worked by the Cage Pit, the engine plane has been extended to a total length of 700 yds., and levels driven from the

bottom to the north and south. An attempt was made to pump the water from the deep by a Cameron pump, the steam for which was conveyed through 1000 yards of naked pipes, but it was found that the pressure reduced from 35 to 8lbs. was not sufficient for the work. Preparations are being made to encase the pipes in some non-conducting material. The ventilation effected by a small furnace amounts to 9,900 cubic feet of air per minute.

In the Main seam worked by the Foord Pit, the north levels have been driven three quarters of a mile; and near the face a pair of stone drifts have been started to the west to intersect the Deap seam, which, it is expected, they will do at a distance of 180 yards. It is proposed in this way to drain and in part work that seam. The Guibal Fan, to which reference was made in a previous report, was put in operation and was found by experiment to give when running at the moderate speed of 47 strokes, 75,000 cubic feet of air per minute, of which quantity 64,400 feet passed through the returns. Shortly after the fan was started, the use of powder was resumed in these workings and the practice initiated in conformity with the new Act. No powder is used in the levels where there is the greater likelihood of feeders of gas being cut, and there the men still use the wedge. On the south side the levels have been driven through the fault, which was ninety feet thick, and a self acting inclined road made to win the rise coal.

The manufacture of Coke has been continued, and the quantity is stated to have been 462 tons. Of late it has been made of duff the screenings from slack coal.

ACADIA.—Although the sales from this colliery are 13,088 tons behind those of last year, they have not been surpassed by those of any other in the Province. The brunt of the strikes in the spring was borne by this colliery, and work had hardly been renewed when it was again suspended for a time in consequence of the Drummond explosion. The exploitation of the mine has since been much extended and the slopes for a new lift are being driven. The pillar working has been continued and has been followed in places by the subsidence of the surface to the no small anxiety of the inhabitants of Westville. A fourth set of three boilers,



the same kind as those previously in use has been aided to supply the increased power required as the workings extend to the deep. When tested in the autumn, 29,000 cubic feet of air were found passing over the furnace per minute.

**INTERCOLONIAL.**—During the early part of the year, this colliery was worked most energetically, and every preparation made to increase the output as rapidly as possible. The exploration of the mine was further increased by driving the main slopes some 300 feet or more to the deep to open out a fourth lift, thus making them about 1750 feet in length. A large stock of coal was banked on the surface and about 7000 tons stowed in the upper workings of the mine. In all, a greater quantity was on hand, than that possessed by any other company when the spring trade opened with every prospect of a successful year's business. Early in May the shipping had already become vigorous, when a strike of the colliers for certain privileges and higher rates of wages closed the workings. After a week's intermission, an agreement was made with the men and they resumed work on the 13th. About noon on that day, a shot fired in one of the low levels on the south side of the pit ignited the coal. Every exertion was made, as detailed in the evidence at the inquest, to put out the fire, but the peculiarly broken condition of the face of the level prevented the men from attacking the flame where the burning gas directly issued in great volume from the solid coal. The fire spread rapidly and as it was soon evident that the chances of subduing it were small, an order was issued that all the hands, who were disinclined to assist at the fire, should leave the pit. Many had previously left, having been driven out of their bords by the smoke. The boys, all except one, had gone up, and of the rest, all but about a dozen men who remained with Richardson, the overman, at the fire, left the lowest landing to walk up the slope. Richardson and his men who so heroically remained to battle with the fire, so long as there was the slightest hope of success, must soon have followed to endeavor to check as speedily as possible the progress of the flames, and save the pit by closing all openings. No attempt to do this was, however, made, for before many of the men who were in the slope had time to escape, an explosion of gas, unexampled on this continent for violence,

occurred, dealing on all sides death and destruction. The sad details are given in the published abstract of the evidence taken at the inquest. The force of the explosion was so great that the wooden rope rollers were torn from their track and hurled out of the slope, as from the mouth of a cannon, falling in the woods some two hundred yards back of the bankhead. Great baulks of timber 14 feet long, by 9 inches through, were cast up out of the Campbell pit to so great a height that on falling, they struck the ground with such force as to fracture them, and the rush of air swept away as would a hurricane the exposed roof of the bankhead. Many explosions took place during the afternoon, and the second occurring about two hours after the first, killed four volunteers who were nobly endeavoring to rescue some men then known to be alive at the bottom of the pumping pit. By the second explosion the ventilation was thoroughly destroyed, and as hopes could no longer be entertained that any life still existed in the mine, all the preparations to explore the workings were then abandoned, and attention alone directed to saving property. The violence and frequency of the explosions struck terror into the hearts of all who rushed to the scene and paralyzed the efforts of those who sought to close the openings. All the available water was turned in to cut off the lower workings, and effectually sealed the bottom of the pumping pit. Still the fire raged, despite every exertion, for 36 hours, and the flames shot up with a fierce roar to the height of from thirty to forty feet from the many openings along the crop. Two days passed before the men engaged in filling the openings had effectually sealed this fiery grave of fifty-five of their comrades.

The workings remained closed until the end of October when one of the slopes was opened and the air allowed to circulate between it and the opening made by a fall near the rise. At the end of a fortnight and just when appearances seemed to warrant preparations being made to re-open the working in a regular manner, the return air showed unquestionable signs that the fresh air was finding its way into places where the heat was still sufficiently intense to cause combustion of the coal or the bituminous shales of the roof. In consequence the pit was again closed and remained so up to the end of the year. Preparations are now in progress to make an entry to

the slope, conducting into the mine no more air than is requisite to supply the men working at the end of the brattice, timbering the slope and stopping the crosscuts, in the hope that by leaving the air of the mine undisturbed, the necessary stoppings may be built to cut off the south side where the fire raged most fiercely and enable the north side to be separately reopened. The prospects of success are most encouraging.

An apparatus, invented by M. Denayrouze called an *aerophore*, has lately attracted much attention in England, and the tests made have proved it to be of practical value for just such service. By its aid, says the inventor, a man, encumbered by no more than 8 or 10 lbs. weight of apparatus, may penetrate at once and to a great distance into a pit filled with choke damp or any other gas, remain there for several hours, carry lamp with him without danger, and have free use of his mind. The apparatus is of two kinds; a low pressure apparatus, which requires that air should be pumped to the miner through india rubber tubing from the nearest point at which pure air can be found; and the high pressure apparatus, which enables the miner to carry his own supply of fresh air in a receiver, and thus make him independent of communication from without. So satisfactory were the experiments considered, that the apparatus was regarded as invaluable for enabling a miner to explore a working charged with gas or to recover a man who could not otherwise escape, and orders were at once given for several to be kept at the collieries in the neighbourhood of the place where the experiments were made.

To keep up a small business until a new winning can be made, a pit some 70 feet has been sunk to the coal lying to the south of the second fault. Subsequently a slope was made and engine erected to continue the workings to the top and the coal lying between the faults. A small pit was also opened on the second seam and the coal gives promise of being of marketable quality. The seam yields not ten feet of clean coal.

**JOVA SCOTIA.**—On the workings of this colliery approaching the northern boundry of the area, several bolings were made in the rise workings of the Acadia, so that instead of a solid

barrier of unwrought coal existing, as required by the terms of the leases, to keep the workings distinct, the communications are numerous and the value of the reservation destroyed. A late survey of the surface and workings proves the correctness of the plan of this colliery's workings and exonerates the Company from any liability connected with the destruction of the barrier.

The operations have been of the ordinary character though much extended. Some trouble has been occasioned by the tender nature of the roof, coupled with the high inclination of the seam, and some bords have been lost by 'crushes.' The ventilation is effected by a furnace, over which some 44,000 cubic feet of air pass per minute.

VALE.—The past year was spent in perfecting the arrangements for working on a large scale. No mining was done beyond driving the slopes and the levels when the main slope had reached a total depth of 850 feet. The chief expenditure was on the surface, building dwellings, constructing a railway to New Glasgow, and preparing a shipping wharf at Pictou Landing.

---

## CAPE BRETON COUNTY,

---

The trade of this County amounted to 520,189 tons, exceeding that of the year before by 37 per cent. The success attending it was attained notwithstanding the serious check received by the hurricane of the 24th August, which, by disabling a large number of vessels and damaging shipping piers, reduced the shipments by at least 25,000 tons below what they would otherwise have been.

### COLLIERIES.

SYDNEY.—The detention unfortunately caused in the sinking of the new pits at Lloyd's Cove by the irruption of a heavy feeder of water which necessitated the lining of the shafts with cast iron tubbing, has prevented the output from



this colliery being much augmented. The progress lately made in the sinking renders it probable that one of the shafts will reach the seam before the end of the current year, and the new winning be in full operation in 1876. When this is effected, the facilities for production will be greatly increased.

The difficulties attending this enterprise being of an unusual character, at least, hitherto unmet with in this country, the means adopted to overcome them are worthy of note. At the place where the sinking is in progress, the coal is expected to be struck at a depth of 696 feet. To win it, two shafts were started in the year 1867, and the erection of the requisite machinery begun. When the shaft intended for the winding shaft had reached the depth of 267 feet, the heavy feeder of water, which caused the temporary abandonment of work, was struck. Preparations had then to be made to case the shafts and while sinking to pump the water until a water-tight stratum on which to seat the wedging crib of the tabbing was reached. But first an adit was driven through the measures from the seashore, a distance of 516 feet, for the discharge from the pumps. For the pumping, an engine of 240 horse power was erected; the cylinder of which is 62 inches in diameter with a stroke of 9 feet. The cylinder stands over a staple shaft in which, when complete, the upper lift of pumps will be placed, the piston rod projecting through the bottom of the cylinder for the attachment of the spears. For the sinking, a 20 inch set of pumps are used, hung in blocks from the surface. Powerful crabs, seven in all, are in use for putting in and lifting the pumps, spears, cradles, &c.; the main ropes being 14 inches in circumference. The winding engine is a direct acting horizontal engine of 160 horse power, having two cylinders, each 36 inches in diameter with a five feet stroke. The rope drum is 18 feet in diameter. Each engine is supplied with steam from a set of four plain cylindrical boilers 5 feet 6 inches in diameter and 35 feet long, fed with water by a donkey engine of 7 inch cylinder. The flues lead into a chimney 85 feet high.

A jack-engine with two horizontal cylinders 14 inches in diameter, is at present employed in sinking the pumping shaft.

When the sinking of the winding shaft was temporarily abandoned, every preparation was made to continue that of the pumping shaft, and during the past year the water bearing strata were pierced, 300 feet of tubing inserted and the feeder in that shaft dammed back. For much of the time the engine had to combat with 650 gallons of water per minute. At the end of the year the pumping shaft stood at a depth of 335 feet, and the staple pit in which work was resumed, on the feeder in the pumping shaft being tubbed back, at 305 feet. In the latter, tubing is now being put, and it is expected that the whole of the 301 feet of tubing required will be shortly in place. When this is completed the remaining 70 feet in the staple pit and the 379 feet in the pumping shaft will be resumed dry. To estimate the difficulties connected with such an operation and the detentions occasioned, it must be remembered that all the changing of buckets and clacks has to be done from the top of the shaft, and that very much time is consequently consumed. First the spears have to be raised, disjointed one by one, the bucket changed, or if it be the clack that is done, the 'fish head' attached with which to get hold of the clack, the spears reconnected, and the clack withdrawn, replaced, and the operation repeated with the bucket. Then the pump is again started, and after some hours' pumping the water, which has rapidly accumulated during the changing of the bucket, is removed, and work resumed.

**LINGAN.**—The working of this colliery was of the ordinary character up to the 1st June, when a fire occurred, and the openings had to be closed. Subsequently an incline road, known as Hall's slope, was opened and some coals were thus obtained, but the business was greatly retarded in consequence of the fire.

The fire is supposed to have originated by a body of gas—ejected perhaps by a fall of the roof—coming in contact with the furnace fire, and causing an explosion which would temporarily reverse the current of air, and occasion the fire which was shortly afterward discovered to be burning in the coal adjoining an underground boiler supplying steam to a





force pump at the deep. In confirmation of this theory, the wooden cupola at the top of the air shaft, was seen suddenly to burst into flame, and then as a reversion of the air took place, the flames for a short time poured down the upcast. The stoker at the underground boiler seeing the flames pour out of the furnace doors, left and went up the slope. The furnace man happened at the time to be getting coal for his fire, and did not see the reversal of the current. The pit was not at work at the time, and no lives were lost. Attempts were made to put out the fire, but they proved ineffectual, and in fear of an explosion the pit was closed. The south side still remains so, although no fear now exists that the fire is still burning.

A new furnace has been erected at the foot of a new upcast 65 feet deep, sunk further to the Northward, where there is a greater natural elevation.

At the Barrasois a small quantity of coal has been mined in the land area.

**VICTORIA.**—One of Cameron's special steam pumps has been placed half way down the slope to relieve the main set of pumps which it is expected will be shortly required for the further extension of the slopes to the deep.

**GARDINER.**—The shaft in course of sinking last year has been put down to the coal, and levels and headways are being driven to open up the mine. Substantial machinery has been erected. For winding, two horizontal engines, with

**RESERVE.**—The ventilation has been improved by substituting for the fire lamp a furnace which is 5 feet 6 inches wide and 6 feet from the floor to the crown of the arch. To carry off the surface water an adit has been driven from the outcropping of the seam in a depression.

The coal wagons in use on the Glasgow and Cape Breton Co.'s railway were found in practice to be unsuited for the coal and the loading of large vessels at the shipping pier at Sydney. They have been altered and a flat substituted for the pitched floor. To empty them tipping tables have been put at the pier, and they have been found to work satisfactorily. There can be no question but that for tender coals,—and all the coals of Cape Breton require careful handling,—drops and reverse shoots are destructive. Besides the saving of the coal by having it slide directly from the wagons on to the shoots instead of dropping many feet on to the shoots or from a height directly into the hold of the vessel, an advantage is gained by the use of tipping tables and wagons with side or end doors, in that a less elevation above the vessels' deck is required.

Too little attention has been hitherto paid by shippers in Cape Breton to the size of the coal sent to market. Much of it gets broken up and shaken by being so tumbled about, that it suffers much at the ports of discharge with a consequent depreciation in value. The change in the manner of shipping at the pier at Sydney cannot be otherwise than beneficial to the coals passing over the Glasgow and Cape Breton railway.

**LORWAY.**—The workings at the West Pit in the crop coal of the Lorway seam have been closed, and the sinking of the permanent pits has been discontinued.

**EMERY.**—This colliery has been opened by the Lorway Co. on a seam overlying the Lorway seam and underlying the Phelan, worked at the neighbouring Reserve Colliery. A slope has been driven and levels won off on both sides. The seam shows 4 feet 9 inches of coal, underlaid by 2 feet 6 inches of fireclay and 1 foot 6 inches of coal.



**SCHOONER POND.**—On driving the slope down some 600 feet the seam was found to thin down from 8 feet to 4 feet 3 inches, and the dip to flatten from 1 in 10 to 1 in 18. At this point the sinking has been stopped and the workings temporarily abandoned. No doubt the seam will be found further to the deep to resume its old dip and to be of the same thickness as it is to the West, the flattening and thinning being due merely to a local trouble. The seam is the same as that worked at the Emery Colliery, and as it has been variously named the Ross, Spencer and McPhail, names designating seams in the Low Point and Cow Bay sections, it has been thought better to avoid confusion in the future, and to re-name it the Emery.

**INTERNATIONAL.**—The ventilation of the pit has been brought under control by a furnace six feet in width, built to the rise of the present workings. A planeway is being driven to the deep and bords opened on both sides. The wire rope being worked by an engine on the surface and conducted down the winding shaft to the planeway.

**GLACE BAY.**—At the Hub pits the operations have been of the customary character. At the Harbor, the pits for the new winning have not yet reached the coal, but the sinking is being steadily prosecuted.

**CALEDONIA.**—The leading headway has been driven to the crop and a travelling road made of it. A self-acting incline road has been made on the East side, worked by a 4 feet clip drum and a steel wire rope 630 feet long. The dip of the incline is one in twelve. On the surface two eight tenement and four two tenement dwellings have been built.

**ONTARIO.**—No change has been made in the method of working, and the business remains small.

**BLOCKHOUSE.**—The business of the colliery suffered severely by the August storm, which damaged the shipping wharf so that for a time only vessels of moderate draft of water

GOWRIE.—A modified system of longwall working has been started in one district of the pit for an experiment. The seam appears well adapted for longwall working pure and simple, and it is expected that the workings in connection with the new pit will be so conducted. A light locomotive has been placed on the railway to replace the horses previously employed. In the mine two self-acting incline roads have been made and found economical.

---

## VICTORIA COUNTY.

---

NEW CAMPBELLTON Colliery, the only one in the county, was re-opened after lying idle for some five years. The operations have been chiefly directed to restoring the railway buildings and openings to the mine. Some new machinery has been procured for furthering the output of this year.

---

## INVERNESS COUNTY.

---

CHIMNEY CORNER.—The destruction of the engine house and miners' dwellings by the fire on the 3rd March suddenly brought the operations of this colliery to a standstill. They have not since been resumed.

---

## RICHMOND COUNTY.

---

Many licenses to search were taken out in this county during the year, and it is said that the Northerly extension of seams, supposed to be indentical with those of the Sea Coast Bay, have been proved in several places, but I have no reports to confirm the statement.



## HANTS COUNTY.

---

A small seam about two feet in thickness has been discovered cropping out in the Kennetcook river, and dipping to the South at an angle of 40 degrees. The seam probably belongs to the lowest beds of the coal measures, and although of no present commercial value, may be so as a guide to further explorations, which, as the measures appear much disturbed, must, to have any likelihood of success, be systematically made. At the place of discovery the thickness of the overlying measures can be but a few hundred feet, as rocks of the Lower Carboniferous are seen dipping in a contrary direction on the opposite banks of the river.

---

## GUYSBOROUGH COUNTY.

---

In this county also there appears to be an outlay patch of the lower coal measures, and at the head of Country Harbuur some thin seams are said to have been found, but no indication of a workable has yet been discovered.

## GOLD MINING.

---

The condition of this branch of the mining industry has maintained much the same position it occupied when reported on last year.

A further decrease in the total yield is noticeable, partially to be accounted for, perhaps, by the general demand for miners throughout the country and the rise in the rates of wages. The Returns from several mines, as those of Lawson at Montagu, Donaldson at Oldham, and the Eldorado Co. at Wine Harbour show highly satisfactory yields.

No changes from those of last year have to be noted in the methods of working the mines, the tribute system being most general. In the last report reference was made to the introduction of this system of mining, by which working miners are enabled to utilize their knowledge and labor to the greatest advantage. It is undoubtedly the best adapted to foster a true mining spirit. As far as possible it should be encouraged, and few official obstructions put in the way of working men willing to venture their labour in mining speculations. At the same time it should not be forgotten that the men of this class are almost always without the capital requisite to open the veins as thoroughly as even they themselves would approve of doing had they adequate means; but for the supply of their immediate necessities they are compelled to extract quartz as speedily as possible, and get some return for their labor. The system, as at present conducted, is only adapted for surface workings and where the water is light. It is attended by this great disadvantage, that the tributers interest in the property they work being merely temporary, they leave the small shafts and slopes imperfectly stowed and secured, in consequence of which rupture of the walls sooner or later taking place allows free access for the infiltration of surface water. This admission of water is not of so much importance when the depth of the workings is shallow, but most serious when great. In most cases it ultimately leads to abandonment, due either to the want of capital necessary to erect pumping apparatus, or because

the expense incurred by pumping becomes insupportable. Unfortunately this country is exceedingly wet and comparatively speaking, level, so that adits for unwatering a district can seldom be resorted to, and pumps have generally to be used. When mines have been abandoned and allowed to fill with water, much expense is entailed on the workers of leads in adjoining areas on account of the water, which finds its way down from the denuded outcrops and through the shattered rock. Were lessees to require proper attention to be paid to the protection of the outcroppings of the leads, either by requiring them to be left unwrought, or the excavated space to be well packed, and the walls kept from falling together, much of this trouble might be avoided. The lessees could make such stipulations with the tributers, and their agent on the ground could see them carried out.

Most of the claims are held in small areas, and while they are so, companies cannot work to advantage. Capital might perchance, however, be profitably invested by being more particularly directed to supplying efficient machinery to do the hoisting and pumping. The leads so drained and made workable being divided into setts and worked by tributers at rates proportionate to the value of the quartz previously extracted from each sett.

#### DISTRICTS.

**STORMONT.**—Work was abandoned early in the year and has not yet been resumed. Miners have, however, not yet lost

## GOLD MINING.

---

The condition of this branch of the mining industry has maintained much the same position it occupied when reported on last year.

A further decrease in the total yield is noticeable, partially to be accounted for, perhaps, by the general demand for miners throughout the country and the rise in the rates of wages. The Returns from several mines, as those of Lawson at Montaga, Donaldson at Oldham, and the Eiderado Co. at Wine Harbour show highly satisfactory yields.

No changes from those of last year have to be noted in the methods of working the mines, the tribute system being most general. In the last report reference was made to the introduction of this system of mining, by which working miners are enabled to utilize their knowledge and labor to the greatest advantage. It is undoubtedly the best adapted to foster a true mining spirit. As far as possible it should be encouraged, and few official obstructions put in the way of working men willing to venture their labour in mining speculations. At the same time it should not be forgotten that the men of this class are almost always without the capital requisite to open the sets as thoroughly as even they themselves would approve of doing had they adequate means; but for the supply of their immediate necessities they are compelled to extract quartz as speedily as possible, and get some return for their labor. The system, as at present conducted, is only adapted for surface workings and where the water is light. It is attended by this great disadvantage, that the tributers interest in the property they work being merely temporary, they leave the small



the expense incurred by pumping becomes insupportable. Unfortunately this country is exceedingly wet and comparatively speaking, level, so that adits for unwatering a district can seldom be resorted to, and pumps have generally to be used. When mines have been abandoned and allowed to fill with water, much expense is entailed on the workers of leads in adjoining areas on account of the water, which finds its way down from the denuded slopes and through the shattered rock. Were lessees to require proper attention to be paid to the protection of the outcroppings of the leads, either by requiring them to be left unwrought, or the excavated space to be well packed, and the walls kept from falling together, much of this trouble might be avoided. The lessees could make such stipulations with the tributers, and their agent on the ground could see them carried out.

Most of the claims are held in small areas, and while they are in the hands of small companies cannot work to advantage. Capital might perhaps, however, be profitably invested by being more particularly directed to supplying efficient machinery to do the hoisting and pumping. The leads so drained and made workable being divided into sets and worked by tributers at rates proportionate to the value of the quartz previously extracted from each set.

The main lead at the Barrasois on the Orient and adjoining properties, areas 2 and 18 Block 6, has been re-opened and worked.

A sample of 32 tons of the best tailings from the Eldorado mill, yielded 1 oz. 13 dwts. 12 grs. of gold and 4 lbs. of mercury, equal to \$34.65, at an expense of \$28.15.

**SHERBROOKE.**—The production of gold in this district was in excess of the previous year. The principal workings being on the Dewar lead in areas 651 and 652 to a depth of 250 feet. The continuation of the lead as far as area 625 has been stripped and as the stopes over this extent have been but imperfectly stowed, a crushing in of the hanging walls, and free admittance of much water, resulted. The lead where it is worked, underlies areas 621, 622, 623, and 653. Mining on this lead was, for a time in the autumn stopped, owing to the destruction of the engine house by fire.

Mining on the leads of the New York and Sherbrooke Company's property was abandoned in August, after four years continuous operation. The main shaft on the South lead, which starts in area 641, enters a depth 20 feet area 611 about midway between the side lines, and terminates at a depth of 300 feet. The stopes on the west side being 25 feet deeper than the shaft, while those on the east are not so deep. The north lead was abandoned when the shaft attained a total depth of 250 feet.

On the Hayden and Derby property, the adjoining area to the south, the lead discovered and opened the year before by Mr. West, was steadily worked, and the stopes, which he carried down 150 feet in width have reached a depth of 90 feet.

The tributers who the previous year took the Palmerston property, continued to work the lead then opened in area 747 and other parties have worked its extension in areas 749 and 750. The lead thus worked is very irregular in thickness often swelling out in the 'rolls' to two feet in width.

Other tributers worked on the Stryker lead, area 751, and on the adjoining properties to the east, the Canada and Caledonia, with various success.



**HARRIGAN COVE.**—Operations were here abandoned early in the year, and although the prospecting had given fair promise of success, the renewal of work has been indefinitely postponed. At Shear's Point, nothing further has been done.

**FIFTEEN MILE STREAM.**—Attention was again directed to this locality, and the tributers who worked are reported to be satisfied with their prospects. They are preparing to erect milling and pumping machinery.

**TANGIER.**—Mr. Forrest continues to be the principal operator in this district. His tribute right on the Tangier Company's property terminating, he ceased working the South lead when the shaft had reached a depth of a 100 feet and the stopes a width of 300 feet, the Little South lead at the depth of 60 feet with stopes 200 feet wide, and the North lead when at a depth of 35 feet. The latter is 80 feet distant from the South lead, and this last from the Little South lead 16 feet, on the small claims numbered 100 to 179.

Some slight excitement was produced in the summer by tributers on the Field lead near the river, striking a rich piece of ground. After the mine had been opened on areas 72 to 84, to a depth of 60 feet and on a length of 200 feet, work was suspended for the winter. The promises held out by this lead induced others to prospect on its continuation across the river, and favorable surface indications were met with.

The Strawberry Hill Company in the beginning of the year sank the main shaft some 12 feet deeper, or to a total depth of 164 feet. The lead, only about one inch thick, yielded nearly one ounce of gold to the ton of quartz, but not sufficient to warrant a continuation of the sinking. They then did some surface prospecting, and drove a tunnel across the leads some 62 feet, but proved nothing satisfactory. Work was then abandoned on the Hill until the autumn, when tributers took Froud's property and discovered a new lead 7 inches thick on areas 233 to 235. They were fortunate in striking the lead, as the 'throw' was fully one hundred feet to the south. So promising does this new lead appear that other parties are opening the extension of the lead



**MONTAGU.**—Mr. Lawson, with his customary vigor, has continued sinking the Albion main shaft in the hopes of again striking a shoot of rich quartz. He has now reached a depth of 300 feet, but has not yet struck paying ground. The mining to the west of the barren ground has proved profitable, and it is the extension of this shoot in an oblique direction that will, it is expected, be struck in the main shaft. In the mill he has adopted the use of blankets, which, if they do not collect more amalgam than the plates, aid, at least, in collecting the auriferous pyrites; and as the pyrites are rich in gold, prove of value.

**RENFREW.**—Mr. McClure trenched some new ground in the eastern section of this district and exposed numerous leads, but none of which did he find promising.

**UNLACKE.**—A few tributaries worked in several places about the district, but with no great success.

## IRON MINING.

Neither of the established iron works were kept fully employed. The Intercolonial Iron and Steel Co. reduced their production pending the transfer of their property to a new company who, it is expected, will erect furnaces on a part of the estate adjacent to the Intercolonial Railway where coal and coke can be readily obtained from the collieries of Spring Hill and Picton.

The Annapolis Iron Works at Clementsport were again started, and the furnace run for some six weeks. The ore used is taken from the Potter and Miller Mines, and is mixed with a certain per centage of bog ore from Bloomfield.

The following table shows the production of ore and pig metal at both establishments :

Iron Works.	Men.	Ore mined.	Ore smelted.	Pig metal.
Acadia .....	26	2947	2091	1046
Annapolis.....	16	538	680	180
Total....	42	3485	2721	1226

In the Pictou Iron field further prospecting was made near Springville, and the bed of Blanchard ore traced in an irregular course to the river. The limonite deposits by the river were also to some extent proved to be continuous. No preparations, however, have yet been made to mine these ores which undoubtedly exist in great quantities.

The explorations on the Indian Reserve near Whycocomagh proved, it is reported, the bed of ore to be about 15 feet in thickness for a distance of 1000 feet.

Other prospecting for iron ore has been made on the strike of the Londonderry vein toward Five Islands, and in strata of the same age back of Cheverie where ore, like that of Londonderry, is said to have been discovered.

The Nictaux beds still remain unworked.

### LEAD.

Attention was again turned to the deposits near Gay's River, but the explorations as far as made did not prove of value. Galena is also known to occur near Stewiacke, Arichat, Sydney and Baddeck. A peculiar deposit is met with near Arisaig. Fragments of calamites with the tissue infiltrated with galena and iron pyrites are found on the outcropping of a sandstone bed, from the denudation of which, doubtless, the metalliferous fossil plants have been derived.

---

### COPPER.

Much interest was again taken in the search for copper ore near Polson's Lake, and in following up the 'float' a large fragment from the vein was struck, which at first was supposed to be part of the outcrop. On discovering the mistake, the explorations were for the time stopped, although it might naturally be surmised that the vein is not far distant. The depth of surface soil greatly retards the work of exploration.

---

### PLASTER, FREESTONE, &c.

## ACCIDENTS.

---

The year 1873 will be ever memorable in the history of our coal mining as the one wherein occurred the first serious disaster, occasioned by an explosion of gas, resulting in greater destruction of life and property than any similar occurrence that ever happened in any mine in America.

I have thought it sufficient this year to publish the list of fatal accidents only, and merely to mention that besides those which resulted in the death of seventy-three men, twenty-four accidents were reported as having caused the maiming or injuring of thirty-one other persons.

In the following tabular statement the relative position which the mines of Nova Scotia bear to those of England and Pennsylvania is shown. Comparatively it is unsatisfactory even when the averages are computed without taking into account the loss of life occasioned by the Drummond explosion. It shows the indubitable necessity for greater attention being paid to the subject; more especially since it has been demonstrated that care has much improved the condition of English mines:

	England. 1872.	Pennsylvania. 1872.	Nova Scoti 1873.
Produce in Tons - - - -	123,393,853	18,929,263	1,051,4
Persons employed - - -	418,088	70,000	4,3
Fatal accidents - - - -	894	- - -	
Lives lost - - - - -	1,060	222	
<i>Averages :</i>			
Persons emp d per accident	468	- - -	
“ “ “ life lost	394	315	
Tons raised per accident -	138,024	- - -	80.
“ “ “ life lost -	116,409	80,762	14.



# TABLE OF FATAL ACCIDENTS.

	Colliery.	Cause.
.....	Vale.....	Fall with tub in Slope.
.....	Lingan.....	Fall of coal.
.....	Gowrie.....	Fall of coal.
others..	Intercolonial. }	Explosion of gas.
)	(Drummond) }	Crushed by train.
.....	International.....	Fall of derrick.
.....	Vale.....	Crushed by train.
.....	International.....	Fall of coal.
.....	Albion Mines.....	Crushed by wagons.
.....	Caledonia.....	Fall of coal.
.....	Acadia.....	Run over by train.
.....	International.....	Crushed tubs in slope.
.....	Vale.....	Crushed by back balance.
.....	Albion Mines.....	

**LIST OF LIVES LOST BY THE DRUMMOND COLLIERY  
EXPLOSION ON THE 18th MAY, 1873.**

**MARRIED.**—James Dunn, *manager*; Joseph Richardson, *overman*; John Bowens, *deputy*; John Bennett, George Burney, John Campbell, Colin C. Chisholm, James Dalling, Robert Dunbar, John Dunn, Philip Dunn, John T. Elliott, John Ellis, John Emery, Henry Freeman, Hugh Gillis, Samuel Hale, John McElvie, Sr., Hugh McGillivray, Hugh McDonald, David McNeil, John McNeil, Jr., James McPherson, Jr., James Ramsay, Angus Smith, and John Walton, *miners*; Roderick McCharles, *carpenter*; Andrew Collin, *volunteer fireman*; Edward Burns, Thomas Glenwright and Abraham Guy, *volunteer miners*.

**SINGLE.**—Timothy Howatt, *volunteer*; Archibald Cameron, Kenneth Cameron, Harvey Campbell, William Elliott, John Fraser, Duncan Halliday, Matthew Lyall, John Manning, Daniel J. McDonald, Duncan McDonald, John McDonald No. 1, John McDonald No. 2, Colin McDonald, John McElvie, Jr., Oliver McLeod, John McRichey, Duncan McRae, Alexander Murray, Nicholas O'Brien, Alexander Purvis, Jr., William Rodgers, Edward Ruddick, Donald Shaw, John Sinclair, D. McFarlane Stewart, George Stewart, and James Webb, *miners*; Edward Jones, *boy*.

**CAUSES OF ACCIDENTS AND LIVES LOST.**

Explosions of gas, 60; falls of coal, 4; falls in slopes, 3; crushed on surface railways, 4; miscellaneous, 2; total 73.

**EXPLOSIONS OF GAS.**

*Accident No. 4.* It is my painful duty to record under this head the occurrence of a lamentable disaster at the Drummond Colliery of the Intercolonial Co. on the 18th May. In a previous part of the report reference is made to the condition of the mine at the time of the accident. The following is a summary of the evidence recorded by the Coroner, as deduced at the inquest on the body of John Dunn, a miner.

*DRUMMOND COLLIERY EXPLOSION.*

Inquest, held at Westville on Wednesday and Thursday, May 14th and 15th, 1873, before the Coroner Dr. Johnstone, and a jury of 12 persons. Mr. Poole, the Government Inspector of Mines, was present, and Mr. Rutherford watched the proceedings on behalf of the owners of the colliery.

*The Coroner.*—Addressing the Inspector:—"I have secured the services of Mr. J. W. Carmichael as foreman of the jury, and although two or three of the jurymen are in positions that would prevent them serving, were the Mines Regulation Act now in force, I think you will find them honest men who will faithfully do their duty." No objection being raised, the Coroner called

*Thomas Lowther*, who said: "I am the overman at the Black Diamond Colliery worked by the Nova Scotia Company. While sitting at dinner on the 13th inst. I heard the noise of a slight explosion. Being told by one of our men that an explosion had taken place at the Drummond Colliery, I proceeded to the scene of the disaster and about one o'clock entered the mouth of No. 1 slope. When I got down about 100 feet I found the stopping in the heading into No. 2 slope blown out and the smoke so thick that I returned, got some brattice, and with six other men again went down. While at work we heard the groans of men further down the slope. We pushed on, got hold of one man, but were so overpowered by the smoke that we had to leave him, and with difficulty made our way to the surface. Shortly after we got up she blasted the second time."

*Alexander Lorimer.*"—I am night fireman at the Drummond Colliery. My duty is to see in the evening, when I go down, that the men have left no fire in their bords, to examine the state of the mine before the men come down in the morning, and to meet the men at the cabin and give those of them safety lamps whose places require their use. I have been night watchman for about 10 months and am well acquainted with gas, having been brought up in old country mines where there was a good deal of gas. On the 12th May, I went down the mine between six and seven in the evening and examined all the places. In several

bords I found gas lying, as was not unusual, and I informed the men, as I always did, who worked in those bords, and gave them their 'sulphur' lamps. The mine was in as good order as usual that night, and during the short time that the strike lasted the ordinary ventilation was maintained and no gas allowed to accumulate. In the morning I found a little gas lying in the lowest level on the South side, but not any in McLeod's (the adjoining level above) where the brattice was within 15 feet of the face. Boards with the word 'danger' painted on them are put in all unsafe places not in use, and strange workmen (new hands) are forbidden to enter the bords unless miners are with them. I have known men burned in consequence of disobeying this regulation. After the explosion occurred I returned to the mine and went down the pumping pit about two o'clock, having heard cries for help, and assisted John Bennet to the surface. James Hunter, who went down with me and remained at the bottom, came up in the next tub, bringing John Dunn who was very badly burnt. Edward Burns then went down with Timothy Howatt, and was in the act of coming up to report on the condition of the bottom of the pit when the second explosion caught him and hurled him to the surface, dead. I was unable to get quite to the bottom of the pit, as rubbish filled it up above the door heads. I helped Bennet clamber up among the timber."

*James Dunstan.*—"I am a cutter, and I went to work on the morning of the 13th inst. after an intermission of a few days. My bord is one of the upper bords of the lowest lift on the South side. Between 11 and 12 o'clock I got word that McLeod's level was on fire and that all hands were required to assist in putting it out. I went at once to the face of McLeod's level and helped to work at the fire, by throwing water and beating at the flames with wet bags, but we could do little as the smoke soon sickened us. We tried again, but were soon driven back. Joe Richardson then came and ordered all who were unwilling to assist any further to leave the pit. He at the same time led about twelve men through the lodgment into the low level to get at the fire from the main intake. Others of us rushed into the level and rescued three men who had fallen overpowered by the smoke when Joe, who had come out to get breath, told us who remained to 'try and get those men out.' Joe went back to the fire and



I waited at the mouth of the lodgment to help men up when they came out to take breath. Mr. Dunn then came along and asked where Joe was. I said, he has just returned into the level. Mr. Dunn said no more but left immediately for the slope. Just then ~~she~~ blasted. I threw myself down in a gutter and crawled to the lodgment, as I found I could not stand in the baffling air. When things became more quiet I made my way toward No. 1 slope, but found No. 2 choked with rubbish. The door leading into No. 1 slope I could not open; hearing some one speak on the other side I called out, but received no answer. Nearly exhausted I made my way back to the lodgment and called up the pumping pit. A tub was lowered to me and I went up. The air at the bottom of the pit was good. If men had immediately obeyed the order, that all who could give no assistance should leave, they would have had plenty of time to escape, as, I believe, the alarm was given to all hands. We are given about five pounds of powder at a time, and have to go to bank for more when required. As far as I am aware the pit was well ventilated, and to the best of my knowledge Joe Richardson always exercised great care in the management of the pit."

*Robert McLeod.*—"I went to work on the morning of the 13th inst. in the main level, No. 2 slope. The night fireman told me, as I was going in, that there were about 15 inches of gas in my place. (Lorimer said that he did not find any.) I found only six inches, and that on the high side. The brattice being close, there was less than usual. During the morning I fired two shots in the fall, and neither set fire to the gas. At about a quarter to twelve, I fired a shot in the bench on the low side. It did not blow well and the gas caught fire. We battled with the fire for about fifteen minutes, and had then to retire for fresh air. When we endeavored to return, we could not for the smoke. Joe Richardson, who then came along, said he would go in by way of the lodgment. We went with him and found the fire had caught the brattice. Joe sent me back to tell the man to start the pump, but who could not for the smoke. I returned, and was again sent out to find Mr. Dunn. I did so by some boys going up in the rake and Mr. Dunn came down when the same rake returned. Joe, who had by this time got back to the lodgment, told me to call the men who were inside, (i. e. working on the north side), 'as it

was a lost case.' I did so, and started immediately up the No. 1 slope. At the bottom, I met 'Mr. Dunn going in, and I told him I feared the pit was gone. When within 200 feet of the mouth, I felt her suck, (the air draw down), and throwing myself down, caught hold of the rail and so resisted the force of the blast. Some of the men ahead of me, were blown away by the blast. One of the men, I know, was my brother who was lost. I was assisted out by a man who came out of the No. 1 top landing."

In answer to the Inspector. "I always tried, as well as on this particular occasion, with my safety lamp, whether there was any lying gas, before I fired a shot. The gas has frequently caught fire from a fall shot, but only once before from a shot in the bench. I never had a shot to operate as the last shot did, that is, blow the coal in the back of the bench and not lift the front from the pavement. Had I been able to shovel away the coal from the face, I could have easily put out the fire. As the pit had been standing there was less water than usual in the barrels, but I have little doubt that the barrels would have been filled in the course of the day. (See A. McLeod's evidence.) About two months previously, Joe said there must be no more powder used in my level, as the day before the low level had caught fire from a shot. I replied, "that I would not work there then." He then told me to go on using it as he had no authority to say that I should be paid extra for wedging. I did not consider it unsafe to use powder, and I never said anything to Mr. Dunn on the use of powder in my level. In the low level powder was prohibited, and in both levels safety lamps were alone used. Before I left the level the first time smoke was backing down against the air."

In answer to Mr. Rutherford. "I have been employed in the Drummond mine, with the exception of sixteen months, ever since it commenced operations. I am perfectly acquainted with the use of the safety lamp as indicating gas, and have alone used it since my brother Andrew has worked with me. In my opinion Richardson was a very careful man about the mine."

*Andrew McLeod.*—"I am a brother of Robert McLeod and was employed by him as his loader. We went down the pit, abo



half-past six on Tuesday morning, and the fireman handed me a sulphur lamp. We never worked with naked lights. On firing the third shot that morning the place took fire. All three of us worked hard for over a quarter of an hour, we then called for help,

useless our going in. My brother and I then turned back to our bord to get our clothes. We told some men we met that the pit was on fire and all were warned to leave. Just as we reached our bord, she blasted, and we were knocked down but were uninjured. We found our way without lights up the gin-slant to the middle level and out on to the middle landing of No. 1 where we found the slope obstructed with tubs and rubbish. Crawling over the rubbish we came upon a number of men lying about, unable to walk, crying and groaning. We stumbled over some of them, but said nothing to them as we with difficulty made our way in the bad air. I think the men we passed were those we left talking at the lower landing when we turned back for our clothes. My brother helped me up the slope to nearly the top when he too became exhausted. I, finding I could go no further, said, 'Go, save yourself if you can and send me help.' Help came, and I was the last man to leave the slope, alive.

*Edward Small.*—"I was a shiftman at the Drummond colliery, and at noon on the 13th inst., was on my way to the furnace to eat my dinner, when I met Purvis and D. McNeil, who told me to return as McLeod's level was on fire. Purvis gave me two safety lamps and I went down. At the pumping pit we passed 20 men standing; we went through the door but could not get far as there was too much smoke. The brattice was then on fire. Bowens came along and told us to come round by the lodgment and get to the fire that way. We went back and met Richardson who said, 'Men follow me.' Joe (Richardson) sent me to the surface for more bags and buckets. I went and was prepared to go down again, when two other men came up and said, I was to help them take off the upper length of pipe in the pumping pit that the water falling back might increase the current of air. We took it off and called down to start the pump (a Cameron steam pump) but received no answer from below. Just then the explosion took place.

*John Lorimer.*—"I am a coal cutter at the Vale Colliery. Previous to three weeks ago I worked at the Drummond and in the low level, next McLeod's. For the last month before I left I did not use powder but before that I did. I was prohibited from using it because it set the place on fire every time a shot was fired. I



at the same time said I would not be responsible for using it, and the overman told me not to use it. I made less wages after I had ceased to use powder, being paid by the shift instead of by the yard I left because they would not give me the rate per yard that I asked. I considered McLeod's place was as dangerous a place to use powder in as my place was. When I stopped working the faces of both places were about square to one another. Sometimes I had much trouble in putting out fire after a shot, sometimes I was twenty to twenty five minutes. I had been the deputy overman three and a half years, but differed with Richardson and took the picks about two years ago. To speak candidly, I was fond of a glass."

By Mr. Rutherford.—"I consider the pit was well managed, There was always plenty of water and appliances provided for putting out fire. The sump was in the upper level but was handy for both levels."

*Samuel B. Coxon.*—"I am a Mining engineer of the County of Durham, England, one of the Directors of the Halifax Company who have lately taken possession of the Albion Mines I believe I have as large an experience in mining operations as any man in England. I arrived at the Drummond Colliery about 2 p. m. on the 13th inst. and found dense volumes of smoke issuing from the natural exits of the mine, precluding the possibility of saving life by means of those exits. Hearing that cries for help had been heard from the pumping pit, Mr. Hudson and I went there. On our arrival we found one man, (James Dunstan) being hauled up in a bucket by manual power. After which, other two were drawn up. Then four volunteers descended to prepare the way for larger gangs of men to search for any who might yet be alive in the mine. Mr. Hudson and I had determined to explore the pit with the hopes of saving life, and were waiting for our safety lamps and the report of the volunteer Burns as to the state of the bottom of the pit, when, as Burns was being drawn up, one of the most terrific explosions I have ever seen took place, casting up the man and the bucket and overthrowing the gin and parts about the pit. The plan of the workings which we were studying at the time, was torn in our hands by the

falling debris. After witnessing this explosion and the subsequent ones, I became convinced that every soul in the mine was lost, and to pursue further investigation in the mine was utterly useless. I then consulted with the other mining engineers present, as to the best and quickest mode of recovering the bodies, extinguishing the fire, and saving property. We, with one consent, determined to inundate the mine, which we attempted to accomplish by diverting the neighbouring brooks and applying every available volume of water. After further consultation, it was determined, that the most effectual means of checking the fire, was by closing all the downcast approaches to the mine which carried air to the flames. This we commenced to do after telegraphing to the Government Inspector of Mines for his authority. I have heard the previous evidence and am led to believe that the third shot fired by McLeod must have set fire to a heavy feeder of gas. As I never was in the mine, I cannot say that it was not safe to use powder in McLeods level. I think that the provisions of the new Mining Act, with regard to the use of powder, are not more stringent than has hitherto been the practice in the North of England, where a properly authorized person fires the shots, and he alone; he having first examined the place and adjacent places with a safety lamp."

Much of the above evidence was given in reply to questions put by the Inspector and the Foreman of the jury

The jury after a short deliberation, rendered the following verdict:—"That the said John Dunn, came to his death on the 13th inst., from an explosion of gas, in the Drummoud Colliery, caused by the derangement of the ventilation of the mine arising from a fire in Robert McLeod's level. We consider care was exhibited in the working of the mine; but we desire to express our regret that powder was permitted to be used in the level worked by Robert McLeod.

As the verdict states, it is truly to be regretted that the use of powder was permitted in the level worked by Robert McLeod. There cannot be a doubt but that the use of powder was the primary cause of the explosion, and the evidence, which is wonderfully full and complete, considering the magni-

trade of the disaster, leaves little room for doubt but that the direct cause was either the ignorance or carelessness of the miners who were working in the level at the time. While we now know that the risk run by the use of powder was exceedingly great, it must be remembered when considering on whose shoulders rests the blame of the occurrence, that its use is general throughout the Province, except in the Foord pit, where the danger is peculiar on account of the liability of cutting heavy feeders of gas; further, the use of powder lessened the cost of production to the Company, and was not only not objected to, but required by the miners; and above all, there was then an entire absence of legal prohibition.

It should be also borne in mind, that competition had previously been sharp, prices low, and at the time the minds of the colliers were disturbed by the condition of the trade in England, and the high rate of wages there ruling. In short there was every inducement for so energetic a manager as the late Mr. Dunn to suppress any prudential fears he may have entertained, and run risks which he hoped by care and attention to divert from leading to serious accidents. The evidence at the inquest goes to show that the general arrangements for conducting the system of working adopted, were good, and although doubts on some points seem to have been held by Richardson, it would be manifestly unjust to impute either rashness, want of skill or care on the part of the manager because the use of powder was permitted. He was well aware that the mine was fiery and required exceptional care in its management, and while his arrangements were prepared to meet all ordinary contingencies arising from the proper use of powder, they could not be for its gross misuse in the hands of workman presumably skilful: men of whose good judgment on the occasion in question grave doubts may to say the least be entertained. To me it appears evident that through carelessness or a desire to save labour either the

and a direct attack made on the place where the gas issued from the solid coal. McLeod in his evidence states that:—  
 “The gas has frequently caught fire from a fall shot but only once before from a shot in the bench. I never had a shot to operate as the last shot did, that is, blow the coal in the back of the bench and not lift it from the pavement. Had I been able to shovel away the coal from the face I could have easily put out the fire.”

The cause of the fire has been clearly shown by the evidence but what caused the untimely explosion? I am led to believe from the following reasons that the seat of the first explosion must have been to the rise of the middle level on the south side. The blast out of No. 2 slope was of double the force of that out of No. 1. To the deep, where the fire originated, Dunstan came out alive and little injured, and several of the men working at the fire, also must have made their way to the bottom of the pumping pit after the first explosion. While from the north side two pairs of men, from the extreme rise and extreme deep workings escaped unhurt. For some time before the explosion occurred smoke was seen coming out of No. 2 slope, and when the fire in McLeods level got strong the men working at it noticed that the air backed down into the level. It would therefore seem that No. 2 slope acted as the upcast from the fire, possibly by a door having been left open, and the pumping pit as the downcast; while the furnace was supplied with air by the overcast from the north side. This would cause the ventilation of the middle and rise workings on the south side to be checked and afford an opportunity for the accumulation of gas and the formation of an inflammable mixture, which, at length coming in contact with the furnace fire, would cause the first explosion. The second and subsequent ones were the natural consequences of the first. The first explosion having blown out the stoppings, the direction of the air current would be no longer controlled to course the workings and dilute the fire damp generated at the face; and the gas again accumulating, at length come in contact with the fire, and cause the second explosion. The concussion would extinguish the flame where the coal was not set on fire, and explosion would follow explosion until the flame spread throughout the workings and ignited every feeder of gas. The quantity of which given off must have



been enormous to produce such terrific explosions so rapidly, and even the ordinary current of air, had it existed, after sweeping the faces on the south side would have been vitiated to a great extent. The quantity of air ordinarily circulating would probably amount to 20,000 feet per minute.

Several minor explosions occurred during the year which resulted in the burning of one or more men on each occasion; all happily unattended by fatal results. These explosions occurred at the Acadia, Caledonia, Lingan, Vale and Victoria Collieries, and were, according to the reports, due without exception, to individual carelessness or laxity of discipline, and on no occasion to sudden outbursts of gas or unaccountable causes.

In my last annual report I mentioned the reluctance shown by some agents to send to the Department reports on accidents. This reluctance is still noticeable, and I have had on several occasions to remind agents that it has been customary hitherto to send forward such reports. All my applications for information regarding particular cases met with a ready response on all except one occasion, when no notice was taken of my written request. A subsequent conversation with the agent led to an explanation of his course, and it appeared that knowing he could not be made to suffer for his refusal, the new Mines Regulation Chapter not being then in force, he considered he was justified in ignoring my right to make the application, and in declining to acknowledge in writing that gas had been allowed to accumulate during working

### *EXPLOSIONS OF POWDER.*

Happily of the accidents reported to have injured some six men by explosions of powder, none terminated fatally, although some of the men wounded were severely burnt. At the Albion gold mine, Montagu, a charge that had missed fire exploded when an attempt to draw it was made and seriously injured two men. The attempt to unram a charge that has missed fire is now interdicted by the Mines Regulation Act, and subjects the transgressor to penalty.

At the Caledonia Colliery an accident resulted from the use of an iron stemmer to ram the first part of the tamping, by which the unfortunate miner lost his eyesight, beside suffering severe burns about the face. The mining law of Great Britain does not permit the use of iron stemmers for this purpose.

### *FALLS OF COAL.*

The fatalities of this class were of the usual character and immediately arose from the oversight or negligence of the men who themselves suffered; due either from failure to sustain or pull down loose coal while working about it. Seven accidents were reported, four of which terminated fatally: Nos. 2, 3, 8 and 10. No. 2 Alexander Ryan was completing a holing, cutting away the "bridge" or "stump" as it is sometimes called, a piece of coal left to the last to support the overhanging mass, when the whole block came away suddenly and killed him instantly. On examination of the place a 'slip' was seen to run directly behind the mass which fell. No. 3 was a like occurrence at the Gowrie Mines. Had it been a rule of the collieries where these accidents happened that sprags must be used when finishing a holing, these casualties would probably not have occurred. But rules unless acted on are of little worth, as exemplified by No. 10, which resulted also from neglect to use sprags when holing as required at the mine where the accident happened. No. 8 is reported to have followed after a distinct warning of danger and instruction had been given respecting the timbering of the roof.



### *ACCIDENTS IN SHAFTS AND SLOPES.*

Two non-fatal accidents were reported to have occurred in the sinking of shafts. Two fatal in slopes. No. 1, is supposed to have been in consequence of the man who was killed, pushing the tub beyond the mouth of the level and falling with it into the slope.

No. 12 was a much more serious accident which took place in the same mine on the 22nd November. Two strangers were admitted into the Vale slope without leave, and when attended by an irresponsible person met with the misadventure narrated in a previous paragraph headed, 'Special Rules.'

### *SURFACE ACCIDENTS.*

The International Co. were singularly unfortunate in that three accidents, Nos. 5, 7, and 11, resulting fatally, occurred on their railway from Bridgeport to Sydney, from men falling off the train while in motion. No. 9 happened at Port Caledonia. Some full wagons getting started on an incline struck some empties, on one of which stood Charles Martell, a man long accustomed to the shunting of the wagons on the wharf, but who on the occasion in question failed to notice the impending collision. On the wagons striking, the empties jumped and the buffers overriding, he was crushed as the wagons came together.

at the Drummond, when the slaughter is wholesale, the sympathies of the people at large are with the families of the sufferers, and contributions of money are freely made for their relief. But when a single fatality occurs, and most of those which happen occur singly, the public attention is not drawn to the trials suddenly imposed on the widow and orphans and to their need of assistance. Beyond the temporary aid afforded by a local subscription, the care of her support is left entirely to her relations, who, most probably, are ill able to bear the additional expense. This system of alms giving is manifestly unfair, and tends to blunt the natural pride of a people accustomed to fairly earn their daily bread.

While still the recollection of the terrible disaster is fresh in the minds of our mining people, I desire to point out to them a system of relief that has been proposed in England, and partly carried out in South Staffordshire; which is, that each district should establish a district permanent insurance fund for the relief of sufferers by colliery accidents. The scheme adopted supplies the required aid as the payment of a just claim and not as a gift of charity. Consequently it meets with the approval of all classes interested and might surely be with advantage introduced into this province, where the inevitable law of averages has shown that a proportionate number of fatalities are here, as well as elsewhere, incidental to the growth of the coal trade.

It is proposed that each miner should make a weekly payment of say 1½d., and each proprietor one farthing per ton on the coal sold. The proceeds of a fund so raised would, supposing the hitherto average rate of mortality is maintained, give to every widow, for a period of ten years, a weekly sum of 6s. 6d, and to each child 2s. 6d. per week.

The Central Committee appointed for disbursing the funds collected for the relief of the sufferers by the Drummond explosion, adopted the following scale for the present relief: To each widow \$1.50 per week, and \$1.00 per week to each child; girls under 15 and boys under 13 years of age.



Special grants were made of \$200 to each widow of the four volunteers who were killed, and testimonials of the value of \$50 given to each of the three surviving volunteers. With some of those who had claims on the Fund, they commuted, and altogether had expended by the end of the year about \$8,800. There are now on the list for relief 27 of the 31 widows, and 80 of the 94 orphans, 4 fathers and 5 mothers left in distress by the explosion.

An abstract account of the subscriptions made for the Fund will be found published with the tables accompanying this report.

I have the honor to be,

Sir,

Your obedient servant,

HENRY S. POOLE.

The Hon. DANIEL MACDONALD,  
Commissioner of Public Works and Mines.

# LIST OF COAL LEASES IN THE PROVINCE.

No.	Lessee.	Colliery.	Area. Sq'r Miles.		Agent and Manager.
1	McKinnon et al.....	ANTIGONISH COUNTY.	3	Not working.	
12	Cumberland Coal Mining Co.	CUMBERLAND COUNTY.	4	"	
13,14,15	C. H. M. Black.....	.....	3	"	
	General Mining Association.	.....	4	"	
	Joggins Coal Mining Co.....	.....	2	"	{ Alex. Barnhill.
	Joggins C'l Min'g Association	Joggins .....	2	working.	{ Robt. Redpath.
11	Lawrence Company .....	.....	1	not working.	
5	Lawson Company .....	Maccan .....	1	"	
1,2,3,4	New York and Acadia Com'y	Scotia .....	4	working.	William Bennett.
6,7,8	Spring Hill Mining Com'y	Spring Hill.....	3	"	William Hall.
9	Victoria Coal Mining Com'y	.....	2	not working.	
		PICTON COUNTY.			
1	Acadia Coal Company.....	Fraser.....	1	not working.	Jesse Hoyt.
3	" .....	Acadia .....	1	working.	
19,21,22	" .....	.....	4	not working.	
	Halifax Company, [Limited.]	Albion.....	4	working.	{ S. Cunard & Co.
11	B. G. Halburton .....	.....	1	not working.	{ James Hudson.
18,14	Intercolonial Company .....	.....	2	"	

# LIST OF COAL LEASES IN THE PROVINCE. (Continued.)

12	Intercolonial Company.....	Drummond .....	1	working.	James Simpson.
6	Lewis R. Kirby.....	.....	1	not working.	
15	Merigomish Co.....	.....	1	"	
10	Montreal and Pictou Co .....	.....	1	"	
23	Sir Hugh Allan, Kt... ..	Vale.....	3	working.	John P. Lawson.
25	Nova Scotia Co.....	Black Diamond.....	4	"	W. W. White.
20	D. E. Price et al.....	.....	2	not working.	
24	M. H. Richey. ....	.....	1	"	
		CAPE BRETON COUNTY.			
2	Thomas D. Archibald.....	Gowrie.....	1	working.	Blowers Archibald.
3	Blowers Archibald.....	"	1	"	
25	Thos. D. Archibald.....	Balmoral.....	1	not working.	
5,28	Block House Mining Co.....	Blockhouse....	2	working.	Robert Belloni.
29	" (sea area).....	.....	1	not working.	
15	Caledonia C. & R. Co.....	Caledonia .....	1	working.	David McKeen.
31	" (sea area).....	.....	1	not working.	
30	Alexander Campbell.....	.....	1	"	
44,45	Halifax Coal & Iron Co.....	Ontario .....	1½	working.	John Sutherland.
46	P. Collins.....	.....	1	not working.	
66	Gardiner C. M. Co .....	Gardiner.....	2	working.	Wm. Routledge.
	General Mining Association.	Bridgeport. ....	2	not working.	{ John Rutherford.
	"	Sydney.....	5	working.	{ Richard H. Brown.
	"	.....	12	not working.	

LIST OF COAL LEASES IN THE PROVINCE. (Continued.)

27	Gen'l M'ng Ass'n	(sea area)	Sydney.....	5	Working.	Richard H. Brown.
	"		Lingan.....	10	"	Donald Lynk.
39	"	(sea area)	.....	5	"	
	"		.....	4	not working	
38	"	(sea area)	.....	5	"	{ E. P. Archbold.
4,12,16	Glac Bay Co.....		Little Glac Bay .....	3	working.	Henry Mitchell.
6,13,18,19	International C. & R. Co....		International .....	4	"	R. N. McDonald.
22	B. J. & J. L. Ingham.....		.....	1	not working.	
64,65	Lorway C. Company.....		Lorway .....	2	working.	
68	"		.....	1	"	Albert J. Hill.
69	"		Emery.....	1	"	
10,21	J. Matheson .....		.....	2	not working.	
47	McInnes & LeCras.....		.....	1	"	
52,53	Hugh McLeod.....		.....	2	"	
49	Gl'w & C. B. (N.S.) C. & R. Co		Reserve.....	1	working.	{ James Harvie.
40,41,42	H. E. Ross et al.....		Pt. Aconi.....	3	not working.	George Scott.
14,24	Schooner Pond Coal Co.....		Schooner Pond.....	2	working.	James Harvie.
43	South Head Co.....		South Head.....	1	not working.	
54 to 63	Sydney C' Mg. Co. (sea areas)		.....	10	"	
67	Weatherbe & Kirby.....		.....	1	"	
32	Wm. Sword (sea area)....		.....	3	"	
34,35,36	Victoria Co. (sea area)....		Victoria .....	5	working.	Joseph Salter.
50,51	" (sea area).....		.....	2	not working.	

E PROVINCE. Continued.

TY.			
.....	2	Not working.	
.....	1	"	
.....	1	"	
.....	1	"	
.....	1	"	
.....	1	"	
.....	1	"	
.....	1	"	
TY.	1	Not working.	
.....			
TY,			Lewis B. Tremain.
...	3	working.	
.....	4	not working.	
.....	177 square miles.		

## COAL.—GENERAL STATEMENT.

1873.	Produce.	Sales.	Colliery Consumption.
1st Quarter.....Tons.	217.327	38.231	26.366
2nd     "                 .....     "	238.242	188.392	25.551
3rd     "                 .....     "	307.954	414.434	25.850
4th     "                 .....     "	287.944	240.049	30.631
Total.....	1.051.467	881.106	108.398
1872.....	880.950	785.914	110.341

N. B.—Stocks on hand at the end of the year, 106.000 Tons.

## COAL SALES.

Markets.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year
	Tons.	Tons.	Tons.	Tons.	Tons.
Quebec .....	.....	70.161	107.940	8.958	187.059
New Brunswick	128	14.515	25.958	27.616	68.217
Newfoundland	1.994	12.195	22.332	19.340	55.861
P. E. Island.....	.....	3.767	13.755	9.318	26.840
Nova Scotia....					
" Land Sales	22.422	8.010	7.891	22.639	60.962
" Seaborne..	4.349	28.905	60.006	61.073	154.333
United States...	893	41.536	159.813	62.518	264.760
West Indies.....	8.445	7.911	11.930	25.927	54.213
Great Britain...	.....	1.392	3.677	1.907	6.976
South America.....	.....	.....	1.132	753	1.885
Total.....	38.231	188.392	414.434	240.049	881.106

COAL TRADE BY COUNTIES.

Table A.

1873.	CUMBERLAND.		PICTOU.		CAPE BRETON.		OTHER COUNTIES.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter.....	3,841	3,319	84,541	20,985	128,561	13,927	384	.....
2nd-Quarter.....	6,834	6,044	77,296	71,650	155,112	110,698	.....	.....
3rd Quarter.....	7,307	7,472	110,823	150,355	189,739	256,601	85	6
4th Quarter.....	9,610	9,510	111,289	90,994	165,673	138,963	372	582
Total.....	27,592	26,345	383,949	333,984	639,085	520,189	841	588
1872.....	15,750	14,153	422,716	388,417	437,326	380,274	5,158	3,070





THE HIGH PER CENTAGE OF COLLIERY CONSUMPTION AT SOME MINES IN PART OR WHOLLY ACCOUNTED FOR BY THE CONSUMPTION AT NEW WORKS, &c. g. The

Collieries.	Names.	Produce.	Bearing Moynity.	Price.	Total.	Per Centage Engines.	Colliery Consumption. Engines.	Per Centage.
Inverness County.	Joggins Main.	Tons. 10326	Tons. 17117	Tons. 2124	Tons. 10241	90	Tons. 725	4
	Black.	1042	1297	79	1376	86	290	14
		6794	5530	196	5726	70	129	7
Pictou County.	Acadia.	112308	93548	14497	104975	97	2979	4
	Deep.	43980	80080	17873	107253	76	18623	17
	Main.	97024	30347	6277	36624	68	1252	13
	Acadia.	41321	267	76	348	82	.....	3
	McBean.	418	83585	14010	78365	92	2480	4
	Acadia.	80808	194	.....	194	6	1266	63
Cape Breton.	McBean.	3008						
	Block House.	52571	47336	511	47649	91	2400	4
	Phelan.	76822	65037	466	65442	67	1243	4
	Emery.	23540	15656	453	16119	63	1460	3
	Lorway.	9160	5696	.....	5696	62	1660	28
	Hub.	46817	44897	751	66457	97	1827	4
	Harbour.	21363	20718	71	20718	90	3155	19
	McAulley.	59425	43036	10143	54079	95	1130	6
	Harbour.	75340	72070	145	72215	95	1812	6
	Langar.	35094	23640	572	28067	79	1900	9
	Langan.	1826	1301	225	20067	90	1771	9
	Barrasom.	329	329	.....	329	82	74	3
Inverness County.	Phelan.	8394	6848	65	6913	64	173	7
	Phelan.	63520	41010	173	41183	59	2459	7
	Emery.	13901	3984	.....	3984	76	453	7
	Sydney Main.	127303	101417	1706	103123	90	24350	23
	Lloyds.	6924	10423	680	11112	90	1049	10
Victoria County.	Ross.	12809	250	100	350	91	55	30
		457	238	.....	238	32	89	30
		1061467	810303	70783	881106	83	70877	10

COAL.—Chap. 9, Sec. 106, (c). "Black Coal, that is coal that shall have passed through a screen, the bars of which are not wider apart than three inches." The high per centage of colliery consumption at some mines is in part or wholly accounted for by the consumption at new works, &c. g. The

**COAL PRODUCTION OF NOVA SCOTIA FROM 1827  
TO 1873, INCLUSIVE.**

	Tons.
1827 to 1830.....	51,172
1831 to 1840.....	808,145
1841 to 1850.....	1,415,385
1851 to 1860 .....	2,292,805
1861 to 1870 .....	5,092,587
1871 to 1873.....	3,231,428
<hr/>	
Grand Total .....	12,879,898 Tons.

**COAL SEABORNE. 1873.**

By 428 Steamers.....	186,744 Tons.
“ 3176 Sailing Vessels.....	633,400 “
<hr/>	
	820,144 “



**EXTRACT FROM THE CUSTOM HOUSE REPORTS,  
SHEWING QUANTITIES AND VALUE OF MINERALS  
EXPORTED FROM NOVA SCOTIA DURING  
THE FISCAL YEAR ENDED 30th JUNE, 1873.**

Minerals.	Countries.	Quantities.	Value.
COAL.....	Great Britain.....	500	\$ 1,875
	United States.....	232,760	434,861
	British West Indies....	1,538	4,278
	Foreign West Indies..	2,835	5,365
	St. Pierre and Miquelon	1,652	3,214
	Malaga.....	100	300
	B. N. A. Provinces ....	51,867	96,104
	Bermuda.....	350	789
	South America.....	1,345	2,923
		292,747	\$549,709
IRON ORE.....	United States.....	300	\$ 1500
MANGANESE.....	United States.....	131	4005
STONE.....	United States.....		28,605
	B. N. A. Provinces.....		4,179

NOTE. -In the Table from which the above is an extract, no account is given of the quantities of gold, grindstones, building stone, plaster, &c. exported, as in previous reports.

**STATEMENT OF COAL IMPORTED INTO AND EXPORTED FROM THE UNITED STATES DURING THE FISCAL YEAR ENDED JUNE 30TH 1873.**

Imported.	Tons.	Value.
1873.	456,015	\$1,539,663
1872.	496,631	\$1,291,206
Decrease..... 40,616		Increase \$248,457

1873 Exported.	Bituminous. Tons.	Anthracite. Tons.
Canada.....	165,290	263,165
Cuba. ....	30,301	24,217
Brazil .....	1,735	98
U. S. Columbia.....	6,363	26,006
West Indies.....	36,363	11,345
Mexico.....	2,411	5,337
West Coast South America	.....	3,242
Europe.....	.....	1,084
Asia.....	.....	7,686
Total.. ..	242,453	342,180
Value.....	\$1,086,253	\$1,827,822

1872, Total Bituminous and Anthracite 400,808 tons.

**COAL IMPORTS AND EXPORTS OF THE UNITED STATES.**

	IMPORTS.	Tons.	
1870.....	420,683	Bituminous.	
1871.....	443,955	"	
1872.....	490,631	"	
1873.....	456,015	"	

	EXPORTS.	Tons.	
1870.....	106,820	Bituminous.	121,098 Anthracite
1871.....	133,380	"	134,571 "
1872.....	141,811	"	259,567 "
1873.....	242,453	"	342,180 "

**COAL EXPORTS FROM GREAT BRITAIN  
TO AMERICA.**

Countries to which Exported.	1871	1872
Canada .....	189.274	175.902
United States .....		
On the Atlantic.....	91.483	58.101
On the Pacific .....	60.365	50.004
British West Indies.....	175.335	147.997
Foreign West Indies.....	281.877	301.323
Mexico .....	2.821	7.609
Central America.. .....	114	6.064
U. S. of Columbia (New Granada) .....	11.241	4.503
Venezuela. ....	370	388
Ecuador .....	1.015	
Peru .....	109.393	191.147
Bolivia .....	2.094	4.020
Chili .....	101.203	218.124
Brazil .....	316.417	315.536
Uruguay .....	96.648	130.914
Argentine Republic .....	62.860	62.312
Falkland Islands.....	245	696

**STATEMENT OF THE NUMBER AND CLASSES OF PERSONS EMPLOYED, AND AVERAGE RESULTS  
AT EACH COLLIERY DURING THE YEAR ENDED 31st DECEMBER, 1873.**

COLLIERY.	UNDERGROUND.				SURFACE.				CONSTRUCTION.		TOTAL.		Ave No. of days per person.		Ave. tons per cutter.	Ave. quantity raised per day.	Horses.		Pits worked.
	Cut's	Labors	Boys	Days	Mech	Labors	Boys	Days	Per. sons.	Days	Per's	Days	Und'g	Surf.			Above	Below	
Black Scotland.....	6	2	.....	1435	.....	.....	.....	.....	4	44	4	44	11	.....	0.9	6	5	9	284
Joggins.....	34	12	11	13189	5	17	3	5324	6	716	88	19239	231	213	2.0	68	5	9	284
Spring Hill.....	11	5	.....	4389	4	21	3	8391	20	3915	64	16895	274	300	2.2	25	6	.....	274
Acadia, Pictou	151	89	18	53806	27	89	6	31585	.....	.....	380	85191	207	275	2.7	411	13	4	273
Albion Mines.....	237	92	61	89153	89	72	34	49237	.....	.....	585	138390	228	252	2.1	{ D 158 M 347	27	24	{ D 277 M 280
Intercolonial.....	60	35	20	23558	12	39	18	15837	44	11773	228	51268	205	231	3.1	186	7	5	222
Mit. hall & Co.....	4	3	1	517	.....	1	.....	100	.....	.....	9	617	64	100	.....	.....	.....	.....	.....
Nova Scotia.....	80	22	18	36254	19	50	10	24514	.....	.....	199	61768	302	310	3.5	283	6	5	303
Vale.....	42	9	.....	9870	10	9	3	5298	79	10240	152	25108	193	241	0.5	30	2	.....	135
Block-house, Cape Breton.	81	24	27	24507	23	73	7	21345	15	3167	250	49019	186	207	3.1	255	9	23	205
Caledonia.....	91	10	14	27891	28	23	4	13106	20	3731	196	44728	242	215	3.2	300	7	13	251
Collins.....	.....	4	.....	48	.....	2	.....	33	.....	.....	6	81	12	17	.....	.....	.....	.....	.....
Gardiner.....	38	7	6	10287	10	20	3	5537	5	631	89	16455	168	168	1.1	42	3	.....	216
Glace Bay.....	93	10	24	35194	20	27	4	14848	42	12336	220	62378	277	291	2.6	{ Hb 167 Hr 71	10	19	{ Hr 289 Hnb 240
Gowrie.....	96	7	26	30489	35	31	10	21257	41	4668	247	56414	236	280	2.2	219	7	4	272
International.....	80	20	17	33900	21	35	3	18145	3	200	179	52245	290	307	3.2	262	8	20	286
Lingan.....	70	15	21	21693	11	52	11	19485	12	745	192	41923	204	267	3.5	149	11	15	247
Lorway.....	49	31	8	17943	22	47	6	13763	32	4851	195	6557	204	183	2.2	B 6	12	4	{ B 54 259
Ontario.....	21	1	2	4492	2	16	1	3125	3	156	46	7773	183	164	1.6	34	2	1	244
Reserve.....	120	10	29	31140	33	48	4	16167	.....	.....	241	47307	185	190	1.8	226	11	12	283
Schooner Pond.....	35	5	8	10209	12	23	4	10020	15	900	102	21129	212	257	2.0	71	6	4	194
Sydney Mines.....	183	34	68	71822	57	85	26	49050	68	20385	521	140257	252	292	2.6	{ L 23 S 473	21	51	{ L 301 S 269
Victoria.....	23	11	3	8909	6	6	4	4776	.....	.....	53	13685	79	73	1.9	178	2	2	288
Chimney Corner, Inverness	14	.....	1	443	.....	3	1	156	.....	.....	20	599	28	39	0.9	14	.....	.....	28
New Campbellton, Victoria.	20	12	3	1302	15	14	3	1367	14	903	81	3632	37	42	0.5	11	5	2	43
<b>TOTAL.....</b>	<b>1639</b>	<b>470</b>	<b>387</b>	<b>562240</b>	<b>464</b>	<b>811</b>	<b>168</b>	<b>353492</b>	<b>423</b>	<b>79421</b>	<b>4362</b>	<b>905153</b>	<b>225</b>	<b>225</b>	<b>2.7</b>	<b>165</b>	<b>186</b>	<b>226</b>	<b>225</b>

.....  
.....  
.....

## COALIERE CONSTRUCTION ACCOUNT

Shafts.	Slopes.	Adits.	Mach- inery.	Colliery Build'g.	Dwell- ings.	Surface Works.	Railw'ys	Wharves	Prospect- ing.
-	-	-	-	-	-	-	-	-	25 00
-	-	201 85	527 60	310 00	978 38	21 00	261	-	-
-	-	204 00	-	12 00	-	-	-	-	-
-	-	200 00	19684 46	3623 37	16830 00	5615 87	16401 10	-	56 70
-	6034 13	-	10884 31	1930 75	13448 63	1564 90	729 96	-	-
3337 64	-	-	10017 10	59 65	4615 46	-	-	-	-
4303 62	3710 42	685 15	6164 05	809 20	13040 00	2568 07	16581 78	202 50	-
-	-	-	-	-	-	-	-	-	388 75
-	1630	-	-	2525 00	2925 00	3280 00	1898 00	1869 00	25 00
-	11627	2855 00	2902 00	300 00	14473 00	1866 00	105387 00	11880 00	-
-	-	-	-	-	-	-	-	-	79 00
-	-	-	629 00	-	-	-	-	7242 70	-
-	392 89	110 94	5171 39	383 36	2610 02	145 95	222 85	1386 84	-
-	-	-	-	-	-	-	-	-	-
2042 42	2233 83	347 33	20250 00	4408 78	4287 00	5459 27	1480 97	-	-
5517 02	-	2774 00	1302 25	2342 00	5100 00	782 12	125 70	-	140 00
9144 80	-	1285 85	2920 00	2585 96	-	-	-	-	-
210 00	-	110 00	950 00	1065 00	1000 00	60 00	850 00	13880 00	-
48 00	-	1414 30	600 00	-	11800 08	2358 76	493 57	2228 36	61 70
684 47	2447 00	3228 16	3211 69	2041 35	7691 21	-	-	907 95	-
-	78 76	548 16	20 00	20 00	-	-	-	-	-
-	1016 24	877 56	6037 87	3481 68	2968 79	767 20	536 68	-	-
-	3577 13	-	2569 68	6518 80	-	1817 98	-	-	-
1423 00	-	-	188 70	98 34	2571 07	819 34	1023 63	1151 83	-
-	-	250 00	1700 00	-	-	900 00	-	200 00	-
-	-	30 00	650 00	-	-	-	575 00	-	-
-	-	1635 00	395 00	-	1393 00	2498 00	464 00	720 00	-
409 20	83,817 80	16,757 40	97,223 10	32,555 24	107,751 58	306,12 26	146,790 44	41,877 18	816 15





## FEBRUARY.

8	50	.....	1	14	19	1	14	19	.....	.....	.....	.....	81	16	.....
27	47	47	1	1	.....	2	6	1	.....	.....	.....	449	6	12	.....
96	449	449	1	1	.....	1	4	4	.....	.....	.....	96	8	.....	.....
48	91	91	1	1	4	3	1	21	.....	.....	.....	126	7	.....	.....
42	101	101	1	5	.....	10	6	.....	.....	.....	.....	156	17	.....	.....
60	308	308	2	1	2	3	14	2	.....	.....	.....	112	2	18	.....
19	55	55	.....	7	12	.....	.....	.....	.....	.....	.....	15	.....	.....	.....
12	40	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	280	280	.....	1	17	.....	1	17	.....	.....	.....	23	19	10	.....
16	56	56	.....	2	5	.....	2	5	.....	.....	.....	6	3	.....	.....
342	1485	1427	.....	14	23	3	14	2	.....	.....	.....	1068	19	16	.....

## MARCH.

DISTRICT.	Number of Mines.	Average No. Men daily employed.	Quartz Raised.		Quartz Crushed.  Tons.	Yield per Ton.		Maximum yield per Ton.		Gold obtained otherwise than from Crusher.		Total yield of Gold.	
			Tons.	Cwt.		lb.	oz.	lb.	oz.	lb.	oz.		
Stormont.....	2	6	47			1	13	1	17			208	4
Wine Harbor.....	1	31	124		124		19	20	11			361	6
Sherbrooke.....	9	125	364		364		19	10	4			113	13
Tangier.....	6	31	109		117		1	16	5			135	16
Montagu.....	2	45	75		75		10	20	8			147	7
Waverley.....	4	58	272		272		1	7	7			95	4
Oldham.....	2	23	70		70								15
Renfrew.....	2	11	30										
Uniacke.....	2	6	27										
Caribou.....	1	4	10		10		12	19	12			6	8
Gay's River.....	1	9	280		280		2	7	2			32	11
Unprocl'd. & other Dis'ts...	1	1											
	33	350	1408		1312		16	19	416			1100	10
									15				9

APRIL.

6	30	.....	1	116	1	5	9	.....	202	19	.....
3	217	187	1	18	5	3	15	.....	355	8	13
1.	390	227	.....	812	2	18	7	.....	96	10	17
4	181	41	3	17	22	3	17	22	159	15	.....
1	41	261	.....	923	..	18	6	.....	130	3	.....
7	261	110	.....	17	19	4	7	.....	98	0	10
9	110	69	.....	319	.....	6	8	.....	13	4	.....
1	69	68	.....	14	12	1	5	10	49	6	.....
6	21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	300	300	.....	220	.....	2	20	.....	43	.....	.....
4	20	20	.....	19	11	19	11	.....	19	9	20
5	1640	1673	.....	13	23	3	17	22	1167	16	12

## MAY.

Average No. men fully employed.	Quartz Refeed. Tons.	Quartz Crush d. Tons.	Yield per Ton.			Maximum yield per Ton			Gold obtained otherwise than from Crusher.			Total yield of Gold.		
			Oz.	Pct.	Gr.	Oz.	Pct.	Gr.	Oz.	Pct.	Gr.	Oz.	Pct.	Gr.
3	50	172	..	4	5	..	4	5	..	..	..	36	3	14
45	244	294	..	17	18	..	1	4	14	..	..	260	18	18
92	902	902	..	12	22	..	2	4	..	..	..	583	17	22
29	89	89	..	15	8	..	1	4	2	..	..	68	2	11
47	110	110	..	1	9	..	3	19	6	..	..	159	10	..
47	258	258	..	8	5	..	17	3	..	..	..	106	..	..
19	34	34	..	11	3	..	1	14	..	..	..	18	19	20
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	29	..	..	..	..	..	..	..	..	..	..	..	..	..
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	200	200	..	2	22	..	2	22	..	..	..	29	9	13
4	20	..	..	..	..	..	..	..	..	..	..	..	..	..
308	1936	2059	..	10	19	..	3	19	6	..	..	1263	2	2



## JULY.

DISTRICTS.	No. of Mines.	Average number of men daily employed.	Quartz Raised.		Quartz Crushed.	Yield per Ton.		Maximum yield per Ton.		Gold obtained otherwise than from Crusher.		Total yield.	
			Tons.	lb.	Tons.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Stormont.....	.....	.....	.....	.....	9	3	18	4	3	.....	.....	1	14
Wine Harbor .....	2	53	259	.....	259	18	7	19	8	.....	.....	237	3
Sherbrooke .....	13	137	740	.....	740	15	2	6	16	.....	.....	559	10
Tangier .....	2	18	64	.....	44	1	3	1	19	.....	.....	50	15
Montagu .....	3	34	133	.....	133	14	20	2	4	.....	.....	98	14
Waverley .....	3	33	76	.....	76	10	13	18	3	.....	.....	40	1
Oldham .....	6	12	17	.....	17	13	19	1	10	.....	.....	11	5
Renfrew .....	2	4	36	.....	36	4	4	7	4	.....	.....	7	10
Uniacke .....	2	3	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Caribon .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gay's River .....	1	5	200	.....	200	1	21	1	21	.....	.....	19	1
Unprocl'd. & other Dist's....	1	1	.....	.....	13	8	2	8	2	.....	.....	5	5
	35	300	1529	.....	1527	13	12	6	16	.....	.....	1031	1

## AUGUST.

rmont .....	2	60	257	257	...	...	11	20	...	16	14	...	...	...	152	5	5
ne Harbor.....	11	108	588	588	...	...	10	11	...	3	8	...	...	...	307	17	8
rbrooke .....	2	15	55	61	...	...	16	12	...	1	12	...	...	...	50	6	..
igier .....	3	30	31	31	...	6	6	..	...	6	6	...	...	...	195	7	..
ntagu .....	3	40	60	60	...	...	6	3	...	..	10	10	...	...	18	8	..
verley .....	3	23	68	68	...	1	16	..	...	3	17	12	...	...	121	13	..
ham .....	1	8	20	...	...	...	...	..	...	...	...	...	...	...	...	..	..
lfrew .....	2	3	3	40	...	...	0	11	...	1	0	11	...	...	40	18	18
jacke .....	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	..	..
ibon .....	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	..	..
's River.....	1	8	180	180	...	...	2	3	...	..	3	2	...	...	19	4	12
procl'd & other Dis'ta.....	1	1	...	13	...	...	8	2	...	..	8	2	...	...	5	5	1
	29	296	1262	1298	...	...	14	1	...	6	6	...	...	...	911	4	20

## SEPTEMBER..

DISTRICTS.	Number of Mines	Average No. men daily employed.	Quartz Raised.		Quartz Crushed.	Yield per ton.		Maximum yield per ton.		Gold obtained otherwise than from Crusher.		Total yield of Gold.	
			Tons.		Tons.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Stormont.....	2	46	274		274	14	22	2	13	209	7	5	
Wine Harbor.....	11	107	706		706	13	8	2	2	471	2		
Sherbrooke.....	2	25	84		65	7		17	12	19	8	11	
Tangier.....	3	27	41		41	2	6	2	15	91	18		
Montagu.....	3	40	201		201	8	16	11	1	87	10		
Waverley.....	4	23	59		59	2	7	4	16	139	12		
Oldham.....	1	4	10		10								
Renfrew.....	2	3	7		7	18	15	18	15	6	10	12	
Uniacke.....													
Caribou.....													
Gay's River.....	1	8	180		180	2	12	2	12	22	9	2	
Unprocl'd. & other Dist's.....	1	1			14	7	12	7	12	5	5	1	
	30	284	1562		1547	13	14	4	16	1053	2	7	



OCTOBER.

36	224	254	1410	1	420	183	11	9
108	528	528	1515	214	7 2	417	13	12
29	69	67	621	3	310	23	2	...
26	29	29	3	310	3	92	...	...
32	118	118	715	10	8	46	5	...
27	87	87	11621	3	522	160	4	10
4	20	10	316	1	2 3	1	16	18
3	5	25	1219	1	2 3	16	0	12
8	250	250	112	112	112	25	1	4
273	1330	1368	14 2	3	522	965	14	17

## NOVEMBER

Quartz Raised.	Quartz Crushed.	Yield per Ton.	Maximum yield per Ton.	Gold obtained other- wise than from Crusher.			Total yield.		
				Oz.	lb.	g.	Oz.	lb.	g.
60	30	18 5	18 5	...	...	...	27	7	...
767	767	11 4	2 4	...	...	...	428	5	...
80	104	8 8	18 6	...	...	...	43	7	18
27	27	2 8	2 8	...	...	...	64	18	...
95	95	10 13	15 15	...	...	...	50	4	...
52	52	1 6 11	7 5	...	...	...	68	7	11
5	28	4 2	13	...	...	...	5	15	...
250	250	1 7	1 7	...	...	...	16	10	...
...	...	...	...	...	...	...	...	...	...
2	1336	10 10	7 5	...	...	...	704	14	5

.....

## DECEMBER.

37	145	222	614	1	7	6	73	1	22
15	693	600	7	1	2	15	244	5	22
18	39	37	11	2	11	2	20	9	22
24	25	25	2	5	14	2	57	6	22
36	105	105	12	1	17	7	63	1	22
35	34	34	3	14	22	22	128	1	22
...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...
1	250	250	1	12	1	12	19	2	2
...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...
36	1291	1366	8	20	22	...	605	6	21

B.

STATEMENT shewing the average daily labor employed, the amount of Quartz crushed, "the yield of Gold per ton of Quartz," the Quantities of Gold from Alluvial Mines, the yield of Gold, the maximum yield per ton in each District, and in the whole Province, and the value of the average yield of Gold per man employed in mining for the Twelve Months ended December 31st, 1873.

DISTRICT.	Average men employed.	Crushing Mills employed.	Steam Power.	Water Power.	Quartz, &c., Crushed.	Yield per ton.	Gold from Alluvial Mines.	Total yield of gold.	Maximum yield per Ton.	Average yield per Man for Twelve Months at \$18.50 per oz.
Stormont.....	3	3	1	2	181	0 4 4	.....	37 18 5	4 5	233 71
Wine Harbor .....	40	5	4	1	2267	0 17 15	.....	2000 0 3	2 13 15	925 00
Sherbrooke .....	101	12	9	3	7187	0 15 9	.....	5026 0 4	6 16 0	920 59
Tangier ...	28	4	3	1	1070	0 13 4	.....	726 11 16	2 18 7	220 75
Montagu .	35	3	3	.	679	2 2 9	.....	1440 3 9	6 6 0	761 14
Waverley..	43	3	2	1	2013	0 10 0	.....	1009 0 0	8 18 6	434 10
Oldham .....	23	3	1	2	662	1 10 3	.....	998 2 17	22 0 0	802 82
Renfrew .....	6	5	2	3	255	0 4 16	.....	59 16 18	7 12	184 34
Uniacke. ....	4	4	3	1	198	0 13 1	.....	129 8 18	1 5 10	599 63
Caribou. ....	1	2	1	1	21	0 16 23	.....	17 16 12	1 0 17	329 29
Gay's River .....	9	1	1	.	2984	0 2 8	33 15 15	352 17 23	2 22	725 30
Unprocl'd and other Dist's.....	5	8	4	4	191	0 5 17	.....	54 11 14	19 11	201 83
	298	53	34	19	17708	0 13 10	33 15 15	11852 8 19	22 0 0	735 82





# No. 3.

STATEMENT shewing the number of Men employed, Quartz crushed, and Gold obtained each month in each District.

MONTH.	UNIACKE.					CARIBOU.					GAY'S RIVER.					UNPROCLAIMED, &c.				
	M	S	L	O	T	M	S	L	O	T	M	S	L	O	T	M	S	L	O	T
January .....	2					4	11	11	8	12	8	250	30		17	19	61	3	5	4
February.....	2					4					8	280	23		10	16	56	6	3	.....
March .....	6					4	10	6	8		9	280	32		11	1				.....
April .....	6	68	49	6							13	300	43			4	20	19	9	20
May .....	8										8	200	29		13	4				.....
June .....	8	30	10	18							14	364	72		15	19	14	9	18	10
July.....	3										5	200	19		20	1	13	5	5	2
August.....	3	40	40	18	18						8	180	19		12	1	13	5	5	1
September .....	3	7	6	10	12						8	180	22		2	1	14	5	5	1
October.....	3	25	16		12						8	250	25		4					.....
November.....	3	28	5	15							9	250	16		10					.....
December .....											11	250	19		2					.....
	4	198	129	8	18	4	21	17	16	12	9	2984	352		17	5	191	54	11	14

*PLASTER, (GYPSUM) TRADE.*

	1872. Tons.	1873. Tons.	Value.
Antigonish,.....	.....	700	700
Big Bras D'or.....	.....	2,575	2,575
Cheverie.....	29,430	30,679	30,679
Hantsport.....	4,340	3,310	3,310
Maitland .....	510	615	651
Parrsboro'.....	.....	2,630	2,630
Walton .....	3,370	4,356	4,356
Windsor.....	61,820	75,828	75,828
	99,470	120,693	\$ 120,693

*FREE STONE.*

	Tons.	
Cheverie.....	405	\$ 1420
Hantsport .....	150	1500
Minudie. ....	475	3800
Windsor.....	150	1202
	1180	\$ 7922

*N. B. The probable shipments from Wallace, 5000 Tons.*

*GRIND STONES.*

	Tons.	
Minudie .....	1,590	\$ 22,260
“ “Ritchie,” 3,500 pieces.	15	1,050
“ “Scythe,” 2,600 boxes	35	3,300

*PLUMBAGINOUS SHALE.*

	Tons.	
Windsor .....	11	\$ 110

*MOULDING SAND.*

	Tons.	
Windsor .....	130	\$ 260



# FINANCIAL STATEMENT—GOLD.

Statement of Mines for the 12 Months ended December 31st, 1873.

		EXPENDITURE.					
Royalty.	Si	Totals.	Salaries, &c	Return of Rents.	Return of Royalty.	Royalty Com'n.	Totals.
10 72	.....	520 39	255 00	16 00	.....	14 72	285 72
17 69	.....	319 69	211 50	22 00	.....	69	284 19
15 55	.....	311 55	.....	.....	144 61	8 05	152 66
14 47	.....	538 47	.....	54 50	.....	10 61	65 11
10 31	.....	144 31	319 96	15 57	.....	9 29	344 82
13 07	.....	1815 07	436 54	.....	.....	48 35	484 89
11 54	.....	2197 54	720 00	78 88	.....	87 93	886 81
.....	.....	16 00	.....	.....	.....	.....	.....
.....	.....	4 00	.....	.....	.....	.....	.....
19 45	.....	547 45	.....	.....	.....	27 46	27 46
15 54	.....	531 54	248 00	47 36	.....	2 12	297 48
17 57	.....	251 57	.....	2 00	.....	5 85	7 85
17 97	.....	95 97	.....	.....	18 57	.....	18 57
.....	.....	6 00	.....	.....	.....	.....	.....
9 11	.....	71 11	31 50	.....	.....	.....	31 50
.....	.....	792 59	.....	.....	.....	.....	.....
2 99	.....	7663 25	2222 50	236 31	163 18	215 07	2837 06

# OTHER THAN GOLD.

Department of Mines for the 12 Months ended December 31st, 1878.

COUNTIES.	RECEIPTS.				EXPENDITURE.			
	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Return Licenses to Search.	Return Licenses to Work.	Surveys.	Totals.
Antigonish .....	\$580.00	.....	.....	580.00	.....	.....	300.00	300.00
Cumberland.....	920.00	1475.00	1477.92	3872.92	.....	.....	.....	60.00
Cape Breton .....	620.00	525.00	51.905.86	53.050.86	60.00	.....	16.00	56.00
Pictou.....	2160.00	525.00	30.123.74	32,808.74	40.00	.....	.....	.....
Inverness .....	900.00	275.00	.....	1175.00	.....	.....	.....	40.00
Colchester .....	500.00	50.00	.....	550.00	40.00	.....	.....	20.00
Halifax.....	40.00	.....	.....	40.00	20.00	.....	.....	.....
Hants .....	240.00	.....	.....	240.00	.....	.....	.....	.....
Richmond .....	380.00	.....	.....	380.00	.....	.....	.....	.....
Victoria .....	220.00	.....	.....	220.00	.....	.....	.....	20.00
Guysborough ..	200.00	.....	.....	200.00	20.00	.....	.....	.....
Lunenburg .....	20.00	.....	.....	20.00	.....	.....	.....	.....
Digby .....	60.00	.....	.....	60.00	.....	.....	.....	.....
Total .....	\$ 6,840.00	2,850.00	83,507.52	93,197.52	180.00	.....	316	496.00

*t December, 1873.*

URE.

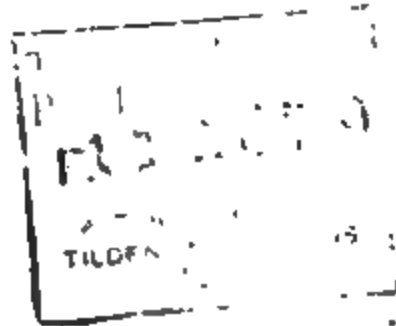
.....	\$ 2222 50	
.....	215 07	87
.....	236 31	
.....	163 18	2837 06
bal..	180 00	
.....	316 00	496 00
.....	81 53	
.....	1972 14	
.....	4943 51	
	<u>6997 18</u>	
		<u>\$10,330 24</u>

**ABSTRACT ACCOUNT of the Subscriptions made for the Relief of the Sufferers by the DRUMMOND COLLIERY EXPLOSION.**

	\$	c.	\$	c.
Halifax, Nova Scotia.....	7842	47		
Pictou ".....	1789	87		
Yarmouth ".....	677	00		
Truro ".....	311	64		
Shubenacadie ".....	131	75		
Goldenville ".....	109	55		
Amherst ".....	65	00	\$10,927	28
Sydney, Cape Breton.....				144 50
Montreal.....				5270 36
St. John, New Brunswick.....	1400	00		
Oxford, ".....	32	84		1432 84
Other Sources.....	499	70		
Eastern Division Intercolonial R. R....	55	00		554 70
Boston, United States.....	1062	24		
Portland ".....	177	76		1240 00
<i>Local Subscription.</i>				
New Glasgow.....	564	00		
Stellarton.....	296	50		
Westville.....	278	78		
Albion Mines.....	663	25		
Acadia Colliery.....	411	75		
Nova Scotia ".....	265	40		
Vale ".....	171	00		2650 68
Blockhouse and Gowrie Collieries.....	266	00		
Reserve Colliery, C. B. ....	231	00		
International ".....	175	56		
Lorway ".....	139	50		
Schooner Pond ".....	98	10		
Caledonia ".....	102	50		
Gardiner ".....	57	00		1069 66
Albert " N.B. ....				65 00
Pennsylvania Mines.....	237	97		
Other Sources abroad.....	84	00		321 97
Total.....			\$23,676	99

# REPORT

OF THE



## DEPARTMENT OF MINES,

NOVA SCOTIA.

FOR THE YEAR 1874.

---

HALIFAX, N. S.

PRINTED BY THE CITIZEN PUBLISHING COMPANY.

1875.

**ABSTRACT ACCOUNT of the Subscriptions made for the  
Relief of the Sufferers by the DRUMMOND COLLIERY EXPLOSION.**

	\$	c.	\$	c.
Halifax, Nova Scotia.....	7842	47		
Pictou ".....	1789	87		
Yarmouth ".....	677	00		
Truro ".....	311	64		
Shubenacadie ".....	131	75		
Goldenville ".....	109	55		
Amherst ".....	65	00	\$10,927	28
Sydney, Cape Breton.....			144	50
Montreal.....			5270	36
St. John, New Brunswick.....	1400	00		
Oxford, ".....	32	84	1432	84
Other Sources.....	499	70		
Eastern Division Intercolonial R. R....	55	00	554	70
Boston, United States.....	1062	24		
Portland ".....	177	76	1240	00
<i>Local Subscription.</i>				
New Glasgow.....	564	00		
Stellarton.....	296	50		
Westville.....	278	78		
Albion Mines.....	663	25		
Acadia Colliery.....	411	75		
Nova Scotia ".....	265	40		
Vale ".....	171	00	2650	68
Blockhouse and Gowrie Collieries.....	266	00		
Reserve Colliery, C. B. ....	231	00		
International ".....	175	56		
Lorway ".....	139	50		
Schooner Pond ".....	98	10		
Caledonia ".....	102	50		
Gardiner ".....	57	00	1069	66
Albert " N.B. ....			65	00
Pennsylvania Mines.....	237	97		
Other Sources abroad.....	84	00	321	97
Total.....			\$23,676	99

# REPORT

OF THE



## DEPARTMENT OF MINES,

NOVA SCOTIA.

FOR THE YEAR 1874.

---

HALIFAX, N. S.

PRINTED BY THE CITIZEN PUBLISHING COMPANY.

1875.

P.

A.

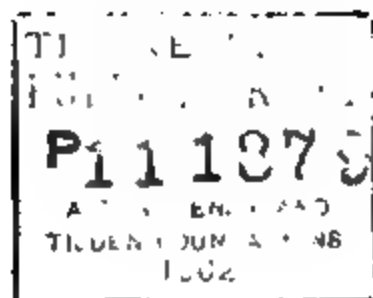
R.

S.

75



## REPORT



# CONTENTS.

---

	PAGE.
Inspector's Report.....	1
General Summary.....	1
Coal Trade.....	2
"    "    with the United States.....	3
"    "    "    "    West Indies.....	6
Improved Appliances.....	6
Coal Cutting Machinery.....	8
Drilling Machines.....	9
Diamond Drills.....	26, 28
Portable Fire Extinguishers.....	10
Direct Acting Steam Pumps .....	10
Pick-handles.....	11
Explosives.....	12
Dynamite. ....	41
Handling Coal.....	13
Shipping.....	14
Screening.....	16
Soft Coal Base-Burners.....	17
Mines Regulation Chapter.....	18
Examination Papers.....	19
Plans.....	22
Weighing.....	23
Coal Mining, Cumberland County.....	25
Pictou County.....	28
Cape Breton.....	32
Victoria County.....	39
Gold Mining.....	40
"    Districts.....	42
Iron Mining.....	49
Ore Analyses .....	80
Lead Mining.....	55
Quarries.—Freestone.....	56
Plaster, &c.....	57
Salt, Petroleum.....	58
Accidents.....	60
List of Leases and Lessees.....	68
Tables.—Coal. Trade by Counties.....	72
General Statement.....	74
Colliery Production.....	75
Total Production; 1785 to 1874.....	76
Exports from Halifax.....	77
Imports of St. John's, New York, &c.....	77
Colliery Labour, &c.....	78
"    Construction Account.....	79
Gold.—General Statement.....	82
District Returns.....	83
Departmental Accounts.....	86



# LETTER

FROM

THE COMMISSIONER OF PUBLIC WORKS AND MINES,

TRANSMITTING

*A Report of the Department of Mines.*

---

DEPARTMENT OF MINES,

*Halifax, February 15th, 1875.*

SIR,—I have the Honor to transmit the report of the Inspector of Mines and the statistical information collected by this Department during the year 1874.

ROBERT ROBERTSON,  
*Commissioner of Public Works and Mines.*

HON. P. C. HILL,

---



**REPORT**  
**ON THE**  
**INSPECTION OF MINES,**  
**IN THE**  
**PROVINCE OF NOVA SCOTIA.**

For the year ended 31st December, 1874.—By HENRY S. POOLE, F. G. S.;  
ASSOCIATE OF THE ROYAL SCHOOL OF MINES.

---

HALIFAX, February, 1875.

SIR,—I have the honour to lay before you my annual report on the state of the mining industries of the Province. In it I have added a few remarks that the mining practices of other countries have suggested, as relevant to our present condition and circumstances.

To prepare the general summary of the mineral produce of the country during 1874, as given below, recourse has been had

A comparison of the above summary with that of the preceding year, shows a falling off in each of the industries represented. While the general dullness of trade will account for the reduced production of coal, plaster and freestone, it will not for that of gold and the continued decline in this branch of mining industry, must be set down to other causes such as the increased price of labour and material. Further reference will be made to this subject under the head of Gold Mining.

**THE COAL TRADE.**—The past year was one of general depression and contrasts unfavourably with the preceding, for beside the actual decrease, 131,979 tons, there was the dullness resulting from the inactivity of new works and want of occupation for the additional labour, drawn by the previous brisk demand, to this branch of business.

The anticipated continuance of the active trade of 1873 was reluctantly acknowledged by many operators to be impossible, so that they continued until well on in the spring, to accumulate stocks. During the first quarter of the year more coal was mined than during any subsequent quarter, and at its end 285,000 tons were on hand, an unusually large amount. Ordinarily the production during the winter months is the smallest of the year. On the first of July the total quantity on bank was as much as 303,000 tons. At some of the mines the sales were as large as they had been in former years, but no where were they equal to the capacity for production. A comparison of the tables stating the labour employed during the two years shows the average number of working days to be lower in 1874, and that consequently in several localities the working man was seriously inconvenienced by the late condition of the trade.

Writers in the public press of England and Canada have, in speaking of the coal trade of Nova Scotia, quoted figures given in the Sessional Papers, which they naturally presumed were correct, being compilations from the Custom House reports, and they have drawn conclusions that those figures seem to deduce. The value of their strictures may be gathered from a comparison of the statements given below. The one compiled from the Custom House reports, and the other from sworn returns made by shippers who had to pay royalty on the amounts stated.



## NOVA SCOTIA COAL EXPORTS SUMMARY.

*Mines Department Statistics.*

For the year ended 30th June—

	1871	1872	1873
B. N. A. Provinces.	179,168	181,996	320,122
Foreign Ports	271,552	360,976	332,172
	<hr/> 450,720	<hr/> 542,972	<hr/> 652,294

*Sessional Papers Statistics.*

For similar periods—

B. N. A. Provinces.	49,808	51,667	70,682
Foreign Ports.	261,808	241,080	294,217
	<hr/> 311,116	<hr/> 292,747	<hr/> 364,899

The practical value of the quoted statistics is apparent. ‘

The history of the coal trade during the past three years is instructive to both producers and consumers. In 1872 all kinds of business were active, manufacture was stimulated and thereby the demand for coal greatly increased. England could not supply her own wants, and the price rose with the foreign demand. In the United States the stocks held were small and urged by the stimulated condition of the general trade unusual activity prevailed, and dealers, going to the other extreme, gave large orders so that the supplies in the summer of 1873 were excessive. Then came the panic in October, and the reaction that set in affected all trades, checked manufacturing, and reduced the demand for coal. The result was an overstock in the spring of 1874, and a sluggish trade throughout the year.

The trade with the United States suffered most by the depression, and the falling off, 126,425 tons, was almost equal to the total decrease of the year's business. Of the quantity exported, Portland took 8084 tons last year for the use of the Allan line of steamers, while some 20,000 tons are annually used by the iron manufacturers of New England. Messrs. Bird, Perkins & Job, whose knowledge of this branch is most thorough, expect but a moderate increase in 1875, and that Cape Breton will not sell more than 80,000 tons for gas purposes. They report that it is

now well known that for gas making only a certain proportion of Provincial coal can economically be used in the States, and then only as an admixture with American gas coals and that unless some contingency arose that would render uncertain the supply of native coal, the imports of Provincial coal will necessarily be limited to such quantities as can be used to advantage. The quantity of coal annually required for gas manufacture in New York and New England is about 850,000 tons, but only the larger works situated in the principal cities on the coast are prepared to advantageously use Provincial with American coal, and the amount thus open this year to Provincial exporters is only about 100,000 tons.

The principal obstacle in the way of increased sales is the great uncertainty as to the first cost of the coal to the purchaser in the States, arising from the fluctuation in the rates of freight which is beyond the control of either the vendor or purchaser. An example may be illustrated by the experience of the past year. In 1873 the average rate of freight from Cape Breton to New York was about \$4.00. The maximum rate was \$4.50. In the spring of 1874 contractors thought they did well to secure tonnage at the apparent low rate of \$3.25, but shipments had hardly commenced before the rate fell to \$2.50. Still later it was reduced to the unprecedented low figure of \$1.75, at which rate some 5,000 tons were shipped in the autumn. Thus there was an actual variation of \$1.50 per ton on the final cost of the coal delivered. Such a possible variation in the final cost to the purchaser is a serious obstacle to the making of extensive contracts.

A mining company cannot afford to assume the risk of delivery at the minimum, nor the purchaser enter into any large contract that may subject him to pay the maximum freight. No such difficulty as this is experienced by either the purchaser or seller of American coals for the New York market. These coals are mined directly on the line of the rail roads, and the cost of transportation to tide water, and thence to the wharf of the purchaser in New York, is fixed at the opening of the season for the entire year. When, therefore, a mining company in Pennsylvania make a contract for 500,000 tons of coal, covering an entire year's shipment, they know just what their coal will net them, and the purchaser knows just what his coal will cost for the entire year, neither party assuming any risk whatever as to the rate of freight. The item

of gold premiums, of course, does not enter into the calculation at all.

The contract price of American gas coal for 1874 was \$7.50 per ton of 2240 lbs., delivered in New York—a reduction of 75 cents from that of 1873. This price was satisfactory to both buyers and sellers. Now, taking the average freight of Cape Breton coal for 1873 as a basis, the estimated cost of Provincial coal delivered in New York for 1874 would have been, viz.:—

Cost at Shipping Port.....	\$2.00
Duty.....	.75
Gold.....	\$2.75
Add for premium on Gold and Insurance .....	40
	<u>\$3.15</u>
Estimated freight .....	4.00
Currency.....	<u>\$7.15</u>

At the estimated difference of value between American and Provincial coal, the latter would not have come into the market to any extent, at a cost of over \$6.50. The actual cost of the coal that was delivered ranged from \$6.44 down to \$4.65; the fluctuation in cost resulting from the changes in the rate of freight. The average cost was \$5.68; but no Cape Breton mining company would have been warranted in contracting to deliver coal in New York at that price, yet the result of the year's work showed that it might have been done, and a handsome margin left for the risk.

In estimating the prospect of an increasing business in the States for our coal, it would be unwise not to overlook the above facts. Whether any practical remedy is at hand to relieve the trade of this embarrassment is a question for the consideration of mining companies if they desire to again increase the business that in former years proved so valuable to them. It must be also borne in mind that the purchaser of Provincial coal must crowd his receipts into about six months of the year in order to avail himself of the most favourable freights; thus necessitating a large accumulation of stocks in advance of actual requirements, subject, of course to interest on cost, storage expenses, and unavoidable depreciation in quality. None of these items enter into the cost of American coal which can be delivered every month in the year direct from the

pit. The time elapsing between the mining of the coal and its delivery at the gas works rarely exceeding one week.

The custom that prevails of banking large quantities of coal in the winter months, for shipment during the succeeding summer, has tended greatly to injure the reputation of our coal in all the markets where it comes in competition with American coal.

Owing to the reduced price of coals in England and the low freights current thence to the West Indies during the early part of 1874, the latter markets received the bulk of their last year's supplies from the English collieries. The partial loss of this trade to our shippers may be also traced to the uncertain rates of freight, and to the fact that at the season when vessels seek the West Indian markets the Cape Breton ports are either inaccessible or are visited under heavy restrictions from underwriters. In 1873 freights from Cape Breton to Cuba varied from \$7.25 to \$4.00 gold. The latter rate placing the coal in Cuba at a cost of about \$6.00 in gold. Before any assurance could be given that no higher rate than this would rule in 1874, large orders for coal were accepted in England at a cost, delivered in Cuba, not exceeding the minimum of 1873. The bulk of the coal required for the West India markets was thus diverted to England and the close of the year 1874 found those markets very heavily stocked. The greater part of that which was sent from Nova Scotia was shipped on ships' account and was sold at ruinously low prices.

The value of a shipping port that can be made available all winter, may be inferred from the fact that vessels at Baltimore accepted \$1.25 to \$1.50 American currency, as freight from that port to Cuba in the month of December, 1874. This low freight quite counterbalancing the extra cost of the coal at Baltimore above our Provincial coal.

Some few cargoes have been shipped to South America but no extensive trade can be expected in that quarter. The supply of coal for that market is almost entirely under the control of parties in England, who do not look with favour on Provincial coal when any other is obtainable.

**IMPROVED APPLIANCES.**—With the increasing price of labour, and increasing demand for rapidity of production and prompt completion of enterprises once undertaken, the inducements to invent tools and machinery to substitute for human skill and brute force,

increase. The increase has of late been rapid and every year brings forth new inventions and finds new applications for successful contrivances even in well beaten paths of production and

---

when economy and extended trade are in prospect. A few references will be made to some of the improvements applicable and conducive to this end.

**COAL CUTTING MACHINERY.**—Quite a number of machines have been invented in Great Britain within the last fifteen years, for the purpose of relieving the miner of his hardest and most trying labour, the cutting of the coal, and, if possible, of doing the work more efficiently and at a less cost. The coal owners in this Province have also naturally had their attention directed to this matter ; but no one has yet ventured to try what elsewhere has invariably proved an expensive experiment. Several companies in England have spent thousands of pounds in the endeavour to bring some of these inventions to perfection, but although many machines have been working for years, it would seem, as far as can be gathered from the conflicting reports of rival inventors, that no one can absolutely be recommended as applicable in all cases. One machine is found superior at one colliery, while its rival surpasses it at another. It is claimed that already the great object in introducing machinery for cutting coal has been attained, and that the work is now done at a less cost, and in a better manner than by hand. Still the confidence of coal owners in the economy attending the use of coal cutting machinery is but slowly growing, and until the advantages are well established and the economy of working some one machine clearly shown, it can hardly be expected that the introduction of a system of working so costly will be undertaken in this Province, while abroad it is still regarded in the light of an experiment.

The following statement made by Mr. Firth, the patentee of the pick machine, is of interest in connection with the subject :

“A machine can under favourable circumstances, cut 20 yards in an hour to a depth of 3 feet, but we consider 10 yards an hour very good work. This is about equal to the day’s work of twelve average men. The persons employed to work the machine are one man, one youth, and one boy, who remove and lay down the road and remove the debris.

For the purpose of comparison, I take 60 tons of coal per day (which would come out of 45 yards of machine working.)”

**COST BY HAND.**

30 men cutting, filling, timbering, drilling, road.laying,  
blasting and all other needful work ready in the

---

coal cutting machinery and its use is extending in the application of power underground to drive locomotives instead of using stationary engines for the haulage. The liberation of fresh air instead of waste gases in the workings is another inducement, as it is a direct aid to the ventilation, while the use of steam is often a cause of much inconvenience on account of the heat and loss of power from condensation in the pipes. To extend the application of compressed air, great attention is now being bestowed on the improvement of compressors.

THE *ÆROPHORE*, mentioned in the last report, as an apparatus which enables men to work in deleterious gases, has been further tested and has given every satisfaction. It has been adopted in some districts in England and several have been procured and so placed as to be ready in cases of emergency.

PORTABLE FIRE EXTINGUISHERS.—At several of the pits in Pictou County, these serviceable appliances have lately been introduced and conveniently placed for use above and below ground. They have been found most useful at the inception of fires which with but the ordinary facilities for extinguishing, might otherwise have proved serious conflagrations. Strictly speaking these instruments are more “flame” than “fire” extinguishers, for they rely more on the sudden evolution of a large volume of carbonic acid gas from a comparatively small quantity of water in which the gas is dissolved, than on the vaporization of the water thrown in contact with the incandescent material. The discharge of the incombustible gas at the place of combustion drives back the atmospheric air and so the flame is extinguished. Then if the burning material be not heated to that degree that the re-admission of air does not renew the flame, the fire is of course extinguished. In mines where there is gas evolved from the face and the dry dust is liable to ignition, there, as a precautionary measure, as long so the use of powder is permitted, the acquisition of these portable extinguishers is desirable.

DIRECT ACTING STEAM PUMPING ENGINES are getting more and more in favour at the collieries, and are largely replacing the old-fashioned, more cumbersome bucket and plunger pumps, for removing such quantities of water as are ordinarily met with in mines. They are now used to discharge water in volumes as great as 9000





gallons an hour from depths of 400 feet. At the Nova Scotia Colliery, a still higher duty is exacted, a pump with a twenty-inch cylinder and six-inch plunger, forces water

without any sense of awkwardness. So much depends in cutting coal on truly delivering the blow, that, although a skilled collier will unconsciously correct the wavering due to a bad handle, he naturally prefers a good one, and is strongly induced to destroy those that are inferior, and so swell the cost of this item of colliery expense.

**EXPLOSIVES.**—Attention was directed in previous reports to the rapidly extending use of explosives more powerful than black powder for aiding the operations of the miner, and special mention was made of Dynamite and the benefits likely to be derived from its introduction into the mines of this country. A quantity has since been imported by F. D. Corbett & Co., the agents in the Maritime Provinces for the British Dynamite Company, and already the sales can be spoken of in tons. Its chief employment has hitherto been at the gold mines, though it is also used with marked effect at the sinking of coal pits and the driving of stone drifts.

In the article in this report relating to gold mining a comparative statement is given from a test made of the relative advantages of Dynamite over powder, and the saving is shown to be as much as thirty per cent. At other mines the economy claimed is even greater. Be that as it may, the one statement is sufficient to show that the use of dynamite does, in some cases, cheapen the cost of gold mining, and consequently enable some mines to be worked at a profit, which otherwise would lie idle.

As is naturally to be expected, some diversity of opinion prevails respecting the invariable economy of its use, and doubtless there are conditions and circumstances in mining, where a disruptive, rather than a shattering force is more advantageous, and there ordinary powder is preferable. As with powder, experience is essential to enable the miner to apply it to the greatest advantage under the different circumstances in which it is used. The nature of the rock to be blasted, has to be studied, and the weight of the charges ascertained by experiment.

There is one point that has to be borne in mind when using dynamite in this country, that has not to be considered in England, that is; that our mean annual temperature happens to be very near to the freezing point of dynamite, 42° Fahr., and that consequently cartridges exposed for some time to the chilling in-



fluences of wet ground, within the first hundred feet or so of the surface, are weakened in their action from partial congelation.

certain amount of disintegration will take place every time it is removed. But because this is so, it is most unwise to neglect care altogether and treat coal as if size were a matter of the last consequence. Something has been done at some of the collieries, but much more can be done to save brittle coal from breakage.

"The South Wales coal is of a brittle character, and at Cardiff it has been found necessary to take special precautions for reducing the loss by breakage that occurs in discharging the coal wagons into vessels' holds. The first appliance for this purpose is the anti-breakage crane. This is a square iron bucket holding one ton of coal, made hopper-shaped, with a hinged flap for discharging at the bottom; it is suspended from an independent light jib crane, fixed at one side of the tip frame. In commencing the loading of a vessel, this bucket is filled from the shoot, and then lowered to the bottom of the hold, and emptied by pulling up the bolt that secures the flap door; the process being repeated until a conical heap of coal is tipped high enough to nearly reach the hatchway. The shoot is then allowed to discharge freely, and delivers close down upon the heap, so as to prevent any breakage of the coal by a vertical drop. The point of the shoot is contracted to check the fall of the coal down the incline, so that the shoot is choked up by the coal, and the discharge from the point requires a little assistance by hand, and is thus kept under control whilst the bucket is being filled. \* \* \* \* The buckets are also used for discharging ballast or ordinary merchandize, and for filling into wagons the small coal that passes the screen in the shoots on to the vessel's deck."

At the West and East docks the balanced tips are used; at the New Basin improved hydraulic tips have been introduced but which being unsuited for this climate need not be further referred to. "Each balance tip is capable of shipping 560 tons of coal per day of ten hours. This tip consists of a suspended cradle or platform sliding in vertical guides, and supported by balance weights connected on each side by chains passing over pulleys at the top of the framing upon which are brakes for controlling the motion of the cradle.

The balance weights are sufficient to raise the cradle and empty wagon, but not equal to the load when a full wagon is upon it. The wagons are each discharged from an end door into an inclined



shoot extending over the hatchway and having screens in the bottom for separating the small coal. The cradle and full wagon are lowered by means of a brake until the wagon is at the top of the shoot and sufficiently tipped for discharging the coal. The brake is then released, the cradle and empty wagon ascend, and the

Breton. The coal being harder it more plainly shows the care bestowed on its preparation.

To reduce the breakage to which coal is subject when thrown, as it ordinarily is, violently from a box on to the screens, tubs with end doors are frequently used, but these are objectionable on account of the increased expense. A late patent by a Mr. Rigg of England does away with the objectionable features of both systems for it allows the ordinary tub to be used. His patent tipping machine consists of a wrought iron rotating frame, like the common cradle, so balanced that it is self-acting both in its forward and backward movement and under the control of a brake. The improvement consists in the simple addition of a projecting plate on the front of the cradle which, rotating with it, receives the coal from the tub and carries it down to the screen where it slides off the plate without a fall on to the bars.

The screening at some mines is better done, is more thorough, than formerly, and the slack is put into more marketable shape by the extraction of the dust. To still further improve the quality of the slack it is proposed to wash it at the Nova Scotia Colliery and it is likely the proposal will be carried out.

For loading the vessels from wagons, shoots are replacing the antiquated drop, still the appliances for this purpose are crude in comparison with the arrangements adopted at Cardiff. The style of wagon too in use is, unfortunately, not the best adapted for saving brittle coal from breakage. Hopper shaped wagons are in all but general use and it is a pity that with the experience of England for guidance, flat cars with end or side doors had not been adopted instead of wagons with bottom doors, for the latter letting the coal down with a drop helps to break it. They are also more troublesome to manage, and slow to empty when the coal is frozen in them during cold weather.

The consideration of screening naturally associates in the mind the uses to which the products can be put. At some of the mines all the slack produced is consumed about the colliery. At others much is left underground or in waste heaps on the surface. The slack of the Pictou coals is mostly all disposed of, but that from the more tender coals of Cape Breton has yet to find a market, at least the greater part of it has, for the quantity sold is small when compared with the total production. With the exception of the

Gowrie Colliery, at no place in the Island is the slack cleaned and prepared for market. During the last year 8571 tons were sent to the United States, and if there is a demand for that quantity it is natural to suppose that a little more care in the preparation, at

all. Coke can be made to replace it at the founderies, and slack with the Dubuque base burner, for heating purposes. Every exertion should be made by our mine owners to legitimately retard the growth of this trade by showing that our coals can supply all the wants of the people. But if they are quietly allowed to supply themselves with the ordinary base burner and get in the habit of using hard coal, the difficulty of eradicating it from the list of imports will be greatly increased. A combined action should be made to practically show that our own soft coal can give to the consumer every advantage that the foreign hard coal possesses, with the additional important advantage, economy.

THE MINES REGULATION CHAPTER, now in force, calls for the special attention of mine managers to certain matters of routine which, as a general rule, were, outside of the Pictou district, not complied with by managers until their attention was personally called to the necessity of so doing. The inattention probably arose not so much from unwillingness as from that ordinary disposition to pay little heed to anything more than the general tenor of such a statute, which is read after the manner of the moral reflections in a novel;—glanced at, recognized as all very right and proper for the guidance of the masses, but quite unnecessary for the consideration of the individual.

Hitherto it has been thought sufficient to admonish when neglect appeared to arise from inattention alone and not from a spirit of opposition. But there is still a want of familiarity with the special requirements of the chapter, and an absence of that regard which must be held, so that due advantage be obtained from the existence of such a statute. This, it is hoped, will in time be remedied although while any man is permitted to occupy the responsible position of manager without being required to have had a special training, the full benefit of the Act cannot be expected. And the sooner a system requiring managers to hold certificates of competency is introduced, the sooner will the standard of mining in this Province improve, and favourably compare with those of other countries.

It will doubtless be interesting for those now holding such positions in this country, to know what is required of candidates for manager's certificates in England, and a specimen set of examination papers is here appended.



THE SUBJECTS UPON WHICH CANDIDATES ARE EXAMINED FOR  
CERTIFICATES.

1. The Coal Mines Regulation Act, 1872. General knowledge of.
2. Ventilation. Theoretical and practical knowledge of

dimensions you would have the air-courses. Give observations regarding the necessity of having the air-course *uniformly* large.

#### MODES OF WORKING COAL.

1.—Explain the ordinary conditions for adopting the long wall and the stoop and room working?

2.—In a seam having a dip and rise of one in six, and the direction of the plane of the coal being to the full rise, sketch what you consider a good form of long wall working for it, having regard to the ventilation, direction of the drawing-roads, &c?

3.—Under the same conditions, give sketch of a stoop and room working by which the greatest percentage of the seam can be got out.

4.—In a 4 ft. seam of coal 80 fms. deep, what size would you make the pillars, having regard to the ultimate extraction of the greatest quantity of coal combined with safety to the workmen?

5.—Give a rough section showing the different seams of coal in your district?

6.—Under ordinary conditions as regards roof and pavement, give your observations on the cost of working a 4 ft. seam of coal by stoop and room, and a 2 ft. seam by long wall, embracing the outcost necessary in each.

#### SINKING, FITTING, AND PUMPING.

1.—Sketch what you consider the best form of a shaft, 100 fms. deep, for an out-put of 300 tons a day, including ordinary provisions for pumps, and showing arrangement of slides and cages, with dimensions?

2.—Explain how you would prevent water met with near the surface from getting into the shaft.

3.—How many gallons are there in 1200 tons of water, and describe the general arrangement and size of pipes for lifting that quantity daily from it 80 fms. deep?

4.—Describe the class of engine best adapted for the above work, size cylinder, stroke, and strokes per minute.

5.—Explain fully the advantage in a deep shaft of having a series of lifts instead of one long lift to the surface.

6.—Explain the action of a syphon, and its use and application in drain-mines.

7.—State the various methods you know of pumping water out of a working.

8.—Describe the best kind of boiler for the safe and economical production of steam.

#### WINDING AND HAULAGE.

1.—Explain the forces acting on a self-acting inclined plane. Compare the friction of ordinary tubs on tram rails with the friction on a well-lubricated railway.

2.—Under the usual conditions of tram rails and tubs, what is the flat-gradient for a self-acting inclined plane 300 fms. long, to pass 100 tons in 8 hours? Sketch the best arrangement of it at the top.

3.—Explain the best mode of drawing coals along a level road, or one not dipping sufficiently to take away the rope.

4.—Explain why conical drums are necessary in deep shafts.

5.—Whether are chains, wire ropes, or hemp ropes preferable, and give your reasons. Giving the breaking strains of a rope, what is a safe working load for it?

6.—State from your experience what is the cost of haulage underground per ton per mile. How does it compare with the cost of a mineral railway above ground? Give your observations on the different modes of haulage known to you, and how you think they might be improved.

7.—Accidents frequently happen on headings where the loaded tubs are taken down with snibbles, by the full tub running into the one before it or into an empty one coming up; how would you remedy this, and still retain the use of snibbles.

8.—In speaking of machinery, what is meant by horse-power?

#### SURVEYING AND DRAWING.

1.—Sketch on paper as near you can the following bearings of a survey 82° N. E., 68 links, 51° S. E. 95 links, 68° N. E. 79 links, 20° N. E. 97 links, 33° N. W. 87 links, 87° N. W. 140 links, 52° S. W. 140 links and 48° S. E. 85 links.

2.—Describe the compass, and explain the circumstances under which it is unreliable.

3.—Explain what is meant by the scale of half-an-inch to a chain.

4.—Describe the process of surveying underground.

5.—Describe how you would plot the same survey on paper, and name the instruments you would require to use.

6.—Why is it necessary to make deductions from the measurements to the rise and dip in steep workings, and how would you find the correct measurements?

7.—Suppose you were driving towards an old waste which is shown only on a plan 20 years old. explain the precautions to be taken as regards the navigation.

6.—How much power would it require to send 10,000 cubic feet of air per minute through an air-course having an area of 40 square feet and how much would the power require to be increased to do it if the area of the air-course was only 20 square feet.

**PLANS.**—Among the special requirements of the Mines Regulation Chapter which need careful and close attention, that relating to the keeping of plans of underground workings is well recognized as essential, though it is not so thoroughly complied with as it might be, few of the plans being so complete as to give, as they should, every information requisite for a thorough understanding of the workings, without necessitating any verbal explanations whatever.

It may not be amiss to mention what an accurate plan should show. To be complete it should give the position of the pits in relation to the nearest boundary of the estate; the position of the shafts, staples, inclines, gowes, the furnace, &c., the permanent stoppings, over-casts, regulators, and doors; the direction of the faults or steps and their extent; the true and magnetic meridians, the scale on which it is constructed, the date of the last survey, and a section, giving the dip of the measures with the relative positions of some points on the surface with others in the workings.

The necessity for complete and accurate plans may not, at first sight, seem to be great, as most of the pits in this country are scattered, yet a little consideration will recall to mind the proximity of some, and the relative position of others to large bodies of water, in which cases it is requisite to know the thickness of the intervening measures to ensure safety.

It will be sufficient to mention one case in the Province to show that not only should plans be perfected, annually or semi-annually, as the custom may be, but that also a record should be kept that would enable (as the law requires,) the further extension of the workings, since the last survey was plotted, to be at any time laid down with approximate accuracy.

After the Drummond explosion in May, 1873, it became a matter of much importance to know the thickness of the coal left as a barrier between the adjoining workings: for it was desired to flood the mine and so extinguish the fire. The officials of the colliery who could make the information positive and complete were among the lost, and the record book of monthly measurements was, without their aid, unreliable for the

purpose of showing the extension of the workings since the last survey was plotted on the plan, consequently no reliance could be put on the thickness of the barrier being equal to withstand a head of water.

It would also be well if a rough working plan were kept by each undermanager on which he could note the changes made in the air courses as the workings progress, and so be enabled to study to supply the air to the best advantage.

**WEIGHING** — In previous reports mention was made of the different systems in vogue for estimating the quantities of coal on which royalty was payable. On this subject little need be at present said. It may, however, not be amiss to remark that some of the coal owners, who considered the requirement that all coal should be weighed was burdensome, now find it for their advantage to weigh all coal shipped to Montreal and other ports, where, they believe, a system of allowances detrimental to their interests is in practice.

Custom has permitted coal miners to regard the royalty as not payable until sales have been made, while a strict rendering of the terms of the Act, would require the royalty to be paid on all the coal extracted from the mines, and a drawback to be allowed on all slack separated, and all coal consumed for colliery purposes.

Were the practice in accordance with the strict rendering, it would necessitate the weighing of all the coal raised from the mines, and enable the payment to the men to be by weight, instead of by measure, as is the more common practice. The systems of paying otherwise than by weight are further objectionable, because they offer premiums to trickery and laziness. When the

system and to pay by weight and not by measure, but they are unable at present to combine for this purpose. The opposition on the part of the workmen to this change offers a strange contrast to the anxiety of their fellow colliers in England to have the system compulsory as they at last obtained, after much resistance, by the passing of the Act of 1872. To say the least, it is interesting to note the directly opposite conclusion arrived at by separate bodies of men having one interest in common, and influenced by the same desire to get the highest wages for their labour. It shows how carefully local prejudices should be considered before the true value of objections raised, even by large bodies of men, can be determined.

At Sydney mines, where this system has been in practice for some years, satisfaction is given to both masters and men, and it is one that the country is equally interested in with the owner as it affects the yield per acre.

# COAL MINING.

## CUMBERLAND COUNTY.

Comparing the business of this county with that of former years a satisfactory increase is noticeable. The sales for the past year having been 88 per cent. in excess of those of 1873, and amounted to 49,599 tons. Had it not been for the late general depressed condition of the trade the projected railway from Spring Hill to Parrsborough would doubtless have been undertaken, and in a year or two given further facilities for the development of the business of the country. As it is, the present means of transportation are not adequate for a rapid or even greater extension of the trade; Dorchester, the present shipping port for Spring Hill coal, is too far away for economical shipment, and the cost of rail-carriage to St. John is too great to allow of much competition in that market with the cheaper seaborne coals.

The revival of the trade in 1873 again drew attention to the mines once worked on the Macan and Hebert rivers, but no steps have as yet been taken to practically re-open them. Mr. Hibbard is opening a seam, by a slope now about 100 feet in depth on the area leased to Gilbert Seaman, underlying that once worked by the Victoria Company on the Herbert river, and he considers it is the continuation of the Joggins Hard Scrabble seam.

Messrs. Smith and Blight have been diligently prospecting on their area; lying between the Styles mine and the St. George colliery, and have formed a company, "The New Dominion Coal Company," to work the property. They have opened the seam in a brook ravine not far from the eastern boundary of the area, and have driven an adit in a westerly direction, under the hill a distance of three hundred feet. The seam dips at an angle of  $44^{\circ}$  and is about five feet thick, with a 20 inch parting of firm clay. The coal, they report is much liked in Amherst as a house coal. Twenty four feet to the deep of this seam is another about three feet thick.

A good deal of prospecting was done in the spring on the Hibbard areas by the Spring Hill and Parrsborough company, and the measures shown to be sharply deflected to the southward and eastward. The seams were not traced more than a quarter of a mile when they were lost, under the heavy surface cover. Evidently the further extension of these Spring Hill beds, if their continuations exist at all in this direction, will be proved with great difficulty and much cost.

Mr. Livesey still indomitably perseveres in his search for coal on his areas, and has imported and set up an English made Diamond Drilling Machine, that works with great precision. He has kindly furnished the following interesting memorandum that helps to give an idea of the capacity of the machine—"Referring to your recent enquiry I may inform you that the total depth of borehole No. 2 made with our English Diamond Boring Machine was 715 feet:  $5\frac{1}{8}$  inches in diameter at the top and  $3\frac{1}{8}$  at the bottom. The time occupied in boring was 48 days at a cost of about \$1160, including repairs and renewal of diamonds, but exclusive of interest, depreciation and royalty. As a general rule, of course, the cost of boring increases with the depth. Thus the cost of the fifth hundred feet was more than twice that of the first hundred. But the rate of increase may be modified by the nature of the strata for I find that the sixth hundred feet was only fifty per cent. in excess of the first. The greatest depth bored in any one day was 36 feet. The average number of persons employed was five. The cost of the machine with 1000 feet of rods was about \$8,500 in England or say \$10,000 erected in Nova Scotia. The bore hole, after passing through slate and sandstones, ended in the conglomerate."

When considering the first cost it should be remembered that the value of such an instrument consists chiefly in the thoroughly satisfactory information it gives of the measures explored. A core of every stratum can be extracted and as critically examined as can be done by means of a pit which allows the miner to place himself in immediate contact with each of the measures sunk through.

At the other end of the Spring Hill district, valuable explorations have been made on the Black areas, and some of the small Black river seams proved to extend for over a mile to the



westward, and to be curving round apparently to conform with those of Spring Hill. One seam has been proved to thicken to something over three feet which may make it a workable bed.

### COLLIERIES.

#### SPRING HILL.

Coal has been won from the Hall slope, which takes the strip along the crop of the seam outside of the General Mining Association's area, while the more permanent establishment at the East slope has been preparing. Much work has been done in building dwellings for the men, erecting workshops, clearing a coal floor, finishing the railway, and otherwise getting the colliery in shape for continuous and systematic working.

The East slope has been sunk on the seam, some 822 feet, at an inclination of  $40^{\circ}$ , and a winding engine with an eighteen inch cylinder and nine foot drum erected. This engine has, what is unusual on colliery machinery, wooden cogs on the follower wheels and the drum revolves with less noise than the ordinary gearing, iron on iron. Water for the engines has been brought through wooden pipes a distance of 2300 feet.

#### SCOTIA.

The working of this colliery remains still on a small scale commensurate with the local demand.

practice has previously been, the coal is now emptied at the top into a shoot 140 feet long inclined at an angle of  $25^{\circ}$ , and the shoot is kept full. The coal is drawn off as required, regulated in its descent by checks and doors.

A furnace 6 feet wide, placed at the bottom of the old shaft, has improved the ventilation.

---

## PICTOU COUNTY.

---

During the first nine months of the year the business of this county was fair but never brisk. The whole year saw an improvement to the extent of 13,942 tons over the previous season, but contracts, that otherwise might have been had, were lost by the coal owners holding off for the prices of the year before. Late in the year a reduction of 12 per cent. in the wages of the men led to a strike which somewhat further reduced the quantity sold.

The borehole in search of coal below New Glasgow was continued with a Diamond Drilling Machine to a depth of 734 feet, when mottled marls, such as are found below the coal, were struck. At the same time a run of sand occurred and the rods became jammed in the hole, and when the endeavour was made to withdraw them, they broke and 250 feet together with the bit and core-barrel were irretrievably lost. A run of sand once or twice took place before on the withdrawal of the rods, and to save expense the hole was not tubed, but only cleaned out, and the boring resumed. Mr. Logan now proposes to test the measures near Cariboo Island where some coal has been found. He has lately put down another hole at the Hardwood hill which shows the cheapness and serviceableness of the American drill. His account of its performance is here added.

"We began to bore on the 21st December and up to this date—the 29th January—have worked 24 days and bored to a depth of 534 feet. The measures pierced have been fireclay and free-stone beds. The best day's work, when using the hollow bit and taking up the cores, was 27 feet, and when working with the solid bit, 31 feet. The machine cost \$5,000. It is operated by one man and a boy, but owing to the late cold weather we have had to have an extra hand to keep the pipes from freezing at night.

## EXPENSES.

Mowing machine and gasoline used	\$111 50
----------------------------------	----------

On the surface the machine shops have been collected under one roof near the Fan so that one engine may drive all the work. New screens have been put up for the bank coal and the regular screens covered in to protect the men when working during broken weather. The weighing scale has been removed to the wharf, the better to comply with the requirements of the Mines Regulation Chapter respecting weighing.

- At the Cage pit the sinking of the incline plane has been continued and the mine drained by means of a special steam pump which receives its steam through 900 feet of pipe. The boiler and the more exposed pipes are served with Spencer's patent, the rest with straw, by which means 60 lbs. pressure on the boiler give 40 lbs. at the pump.

The mine is worked in the ordinary way. The rooms are driven horizontally, and the coal is lowered to the main level by means of counterbalances.

561 tons of Coke have been made, and four new ovens are in course of erection.

#### INTERCOLONIAL.

The new, or No. 4, slope mentioned in the last report as started to the south of the fault that bounded the old workings, was continued to a depth of 1100 feet and coal was won on either side between the faults. At the same time the old workings were in part opened up. An overhead brattice was carried down No. 1 slope, and the crosscuts built up as the work of opening out the slope progressed until the water was reached at a depth of 600 feet. Then the old workings on the north side where there had been no fire were opened and swept free of after damp. The coal that had been stowed in the bords in this part of the mine was recovered and the two lower rows of pillars robbed. Simultaneously the work of opening the south side was cautiously conducted and is still progressing, happily without finding any indications that fire exists in the crop workings on that side. When all doubt on this important matter is removed the work of pumping out the water which now fills the lower part of the mine will be next undertaken. It is expected that in the course of the year the whole of the old workings will be made accessible.

While the work of exploration was going on the bodies of some

seventeen of those who were lost were recovered. The rest are supposed to be under water, some in the slope and the others

## VALE.

During the year this colliery got into operation and shipped some 38,000 tons. On the surface the accommodation for workmen was increased and some thirty-four double blocks and seven blocks of four tenements each were completed. A locomotive was purchased to run the wagons to and from the siding at New Glasgow, and the pier finished below the Pictou Landing for the shipment of the coal.

Under ground, the rooms have been driven horizontally 15 feet wide between pillars left 12 feet wide, and 60 to 70 feet long. Two counterbalances have been put up on each side, one to each landing.

The pit tubs adopted are 4 feet 9 inches long by 2 feet 8 inches wide, and 2 feet 1 inch high. They have 10 inch wheels; with a 2 foot wheel base, and run on a 2 feet 5 inch gauge.

Mitchell and Barton have continued to mine small quantities of coal from their area, which they are able to dispose of to the country people of Sutherland's river and that section of the county.

---

**CAPE BRETON.**


---

While the trade of Cumberland and Pictou counties was in excess of the previous years, that of this county was far behind and not more than 65 per cent. of that of 1873. The falling off appears most noticeable in the trade with the United States, where the demand for Provincial coal was unusually light. Then the fall in the price of coal in England enabled vessels bound for the St. Lawrence to carry coal out as ballast, and so undersell Nova Scotian coal that had to pay freight. In Nova Scotia proper the railways enable some business to be carried on during the winter months, but in this island there is little local demand, and the practice of banking has alone to be resorted to to give the men employment at that season.

During the year the railway of the Cape Breton company was extended from the Reserve and Emery collieries to Louisburg and once again, after more than a century had passed, has that port become a scene of industry. It is expected that the railway and shipping pier will be completed in the spring, when the company

hope to control the western trade by obtaining lower freights than can be secured to the eastward of Scatarie. Louisburg being an open port it is expected that coal will be shipped from thence all the year round, and that steamers bound across the Atlantic will make it a port of call for fuel.

It is also proposed, it is said, to erect both iron and copper smelting furnaces. At present the copper ore from Tilt Cove Newfoundland, is shipped direct to Swansea, but the owners of the mines are of opinion that it would be cheaper to ship it to Cape Breton, for smelting, and then send the resulting regulus to Swansea. It is to be hoped that this idea will prove feasible and be carried out. As for Iron smelting, all that is required is a general revival of that industry, for Cape Breton is in itself abundantly supplied with all the necessary raw products that should make the manufacture of iron a profitable business.

### COLLIERIES.

#### SYDNEY.

This and Lingau are the only mines now worked by the General Mining Association of London. The operations at Sydney have not been on the usual scale or equal to the facilities, of so extensive an establishment, the production being very much less than that of former years. Various circumstances have contributed to this result, but the principal cause has been the reduction of the working space in the pit consequent on the accumulation of water in the deeper portions of the mine. The water made in the dip workings had been for some years allowed to collect in the lower places with the expectation that on the new shaft at Lloyd's Cove being completed it could there be much more easily removed than by raising it at the Queen pit. The difficulties, however, experienced in sinking through the heavy feeders of water that were met with prolonged the completion much beyond the time anticipated, and a larger body of water, in consequence accumulated than was at first intended. A number of working places had therefore to be abandoned, and the men removed to a new section of the pit, where the seam was for a time found to be troubled, and where from its irregular thickness much delay was occasioned in the winning out of new places. The production was

was, however, made in the output during the season, and the productive powers of the mine almost restored. The water in the lower workings is for the present kept from further encroachment by two steam pumps placed in the mine and supplied with steam from the surface.

In the course of the year the effective shutting off of the feeders in the new shaft was accomplished and the sinking rapidly progressed in dry ground. In one month 66 feet were sunk; and in November last the coal was reached at a depth of 681 feet. The seam is of the usual thickness, 6 feet, and of a quality that will maintain the reputation of the widely known "Sydney Coal." The usual requirements of a pumping shaft, a sump and standage for water, are now being provided and the lower set of pumps is now being placed in the shaft. Meanwhile the shaft bolings have been made and a drift is being driven to the rise, by which it is intended to tap the water in the Queen Pit workings and bring it to the pumps. This connection, it is expected, will shortly be made and its completion will render unnecessary the further use of the steam pumps. It will also enable the bords to the deep to be re-opened and a greater working space provided.

Preparations are at the same time being made for raising coal at the new pit during the ensuing season and an increased output may therefore be expected. The branch railway to connect with the new winning is nearly complete and the rails will be laid early in the season. A new wharf, which will be 500 feet long, is being built at the Bar, and while giving additional means for shipping, will give what is much needed greater depth of water for the large class of vessels which are now often engaged in the coal trade. The house accommodation has been further increased by the addition of 32 tenements which are of an improved style and well adapted to the requirements of the occupants.

The ventilation of the workings has been improved by the increase of the furnace power. A second furnace 6 feet wide with 135 yards of heating column has been added. To reduce the consumption of fuel and to protect the firemen, the boilers have been shedded over.

#### LINGAN.

The output from this colliery is again much below the usual production; but is almost entirely due to the depressed state of the trade. The position of the mine as regards working



space, which was much contracted by the accident in 1873, is rapidly improving; new working places having been won out to the North and to the deep. Little, however, was done after the commencement of the shipping season and operations were discontinued early in the fall.

As it was apprehended that the fire which occurred at the time of the accident might not be thoroughly extinguished, it was considered advisable to allow the workings to fill with water. A recent examination showed the fire to be extinguished and the water is now being pumped out with the view to the resumption of work this coming season in the places formerly in operation.

On the surface, foundations are prepared for a new winding engine of a more modern description than the one now in use; and 16 tenements have been added to the house accomodation.

#### THE CAPE BRETON COMPANY.

In pursuance of the Mines Regulation Chapter the agents of the Reserve, Emery and Schooner Pond Collieries reported that these properties have been transferred to the above named company, but no legal transfer has yet been made and the leases still remain in the names of the respective companies that held them last year.

#### RESERVE.

No coal has been mined at this colliery since the summer the stock on hand then being sufficient for the demand. In the mine the main slope has been extended to a length of 2040 feet, and the west slope 1320 feet. The rooms are driven 16½ feet wide, leaving the pillars of an equal width. The dip of the seam is one in twelve. At the outcrop a parting in the top of the seam was three feet in thickness which at the bottom of the slope is reduced to 3 inches. It also thins to the West and is entirely wanting at the Caledonia pit, while it thickens to the east and is some 10 feet thick at Old Bridgeport. The ventilation of the mine is regulated by a furnace 5 feet 6 inches wide, and 3 feet above the bars. The wooden cupola on the surface is contracted to an area of 16 square feet.

#### EMERY.

The working of this colliery was also early suspended and has not since been resumed. Machinery similar to that at the Re-

serve has been erected. The winding engine has one 24-inch cylinder with a 4 foot stroke. It is geared one to two and has friction drums. Five boilers 33 feet long, and 3 feet in diameter, supply the steam to this engine, the fitting up shop, and to the pump which is a direct-acting steam pump placed at the bottom of a pit chiefly sunk for the column of delivery pipes.

#### SCHOONER POND.

No coal was mined at this colliery during the year and the workings were allowed to fill with water as at the Emery and Reserve.

#### GARDINER.

Headways have been driven to the rise 18 chasms, and a pit 55 feet deep sunk for ventilating purposes. The pit has been opened out with rooms 18 feet wide, leaving pillars 10 yards thick by 40 yards long, with a view to the subsequent working of the pillars. The seam varies in thickness from 3 feet 6 inches to 4 feet 6 inches. It has a strong post roof and a fireclay floor.

The coal from this colliery is shipped from the International pier at Sydney.

#### INTERNATIONAL.

A new lift has been opened by a dip incline 1320 feet long, the pillars being left 8 yards thick by 20 or 40 yards in length. As is now generally done the pumping is effected by a direct acting steam pump. A new one has been added, which has a 16-inch cylinder and 7-inch plunger, and for which the steam is conducted from the surface.

#### GLACE BAY.

Mining was principally carried on in the Harbour seam, the Roost Pit on the Hub seam having been early closed. The sinking of the new or Stirling pit has been completed and the Harbour seam struck at the depth of 234 feet. The sinking was delayed by the quantity of water met with, which at times was as much as 8000 gallons per hour. Great advantage was found attending the use of dynamite in the sinking as no time was lost in drying the holes or in making water-tight cartridges. The shots were fired by electricity. The winding engine has a pair of horizontal 11-inch cylinders with a stroke of 3 feet 6 inches, driving direct a 6 foot draw.

The entrance to the harbour has been improved by the widening of the channel to a width of 100 feet.

## CALEDONIA.

A few pillars have been removed, a second incline plane fitted up, and upper levels driven from the inclines. On the surface more tenements and mechanic's houses have been erected, the screens covered in and additional boiler power furnished.

substantial character. The face is built of timbers one foot square backed and bolted to round logs not less than a foot in diameter at the small end.

#### GOWRIE.

The removal of the pillars has received some attention. A face of work is carried up in the pillar from the highest cross cut to the broken and the remainder of the pillar brought in working back. A new method of working has been adopted in one section of the pit. Rooms 30 feet wide are driven between pillars 18 feet thick. A road is carried up on each side and the centre is stowed with the shale and refuse coal.

Clip pulleys have been adopted in the self-acting inclines by which now all the coal from the rise workings is lowered to the main levels.

The mine water is so corrosive that it has been found economical to replace the cast iron pipes by pump trees of birch, the working barrels being lined with babbit metal. Some progress has been made towards establishing the new winning to the Northwest of the present pits. A railway three-quarters of a mile long has been built and machinery erected. The winding engine has two horizontal 20-inch cylinders with a 3 foot 6 inch stroke. The drums and pulleys are 8 feet in diameter and are for round ropes. There are 4 flash flue boilers, 30 feet long by 3 feet in diameter. The completion of this new winning will probably be made during the current year.

#### SOUTH HEAD.

It is expected that work will be resumed at this colliery in the Spring and a wharf built for the shipment of the coal.

At Loch Lomond, about six miles from Big Pond, at the head of East Bay, coal has been found. The seam is said to dip at an angle of 20 degrees and to have 18 inches and 2 feet of coal separated by a parting of 3½ feet thick.

Mesars. Ingraham have been taking a few tons of coal from the outcrop of the Indian Cove seam on their area adjoining the Sydney mines.

## VICTORIA COUNTY.

---

In this, the only other county in which coal mining has been prosecuted, the chief operations have been at the New Campbellton, where the pit has been put in order, the slope extended to a depth of 580 feet and new rooms broke off. The tubs and wagons repaired, a new hoisting engine ordered and a locomotive purchased

## GOLD MINING.

---

“What is the cause of the decline in the Gold Mining of Nova Scotia” is a question often asked, for it is only too apparent that year by year the yield of gold is lessening and the number of men engaged in mining reduced. Seven years ago 27,583 ounces were extracted from 30,673 tons of quartz by the labour of 676 men, and last year but 9140 ounces were obtained from 13844 tons of quartz mined by 246 men. An answer is not far to seek but a remedy is not so readily available. Among the causes that have been assigned for the decline are over speculation, share dealing in place of quartz mining, incompetent and expensive management, and lastly dishonesty. These all doubtless did exist and had their influence, and yet the decline continues even now when most of the causes that are presumed to have largely produced it have passed away. Search must consequently be made deeper, and it is feared some allowances must be made for the natural obstacles to be surmounted in the mines themselves, such as the excessive thinness of the paying leads, the disproportionate expense of pumping and an absence of rich finds and large profits to excite further prospecting and continued labour in spite of non-success.

Capital has been already induced to speculate in our mines but on the whole it failed to do so profitably. To turn it again into the same channel will be difficult. It can only be done, now that companies have nearly ceased to interest themselves in our gold mines, by showing that individuals and companies of tributers can do more than merely make wages by working the outcrops of the leads, and to show that experience has been gained, economy learnt, and improved methods of mining and milling introduced since the first attempt was made to bring capital into the business.

Money has been made at gold mining in Nova Scotia and among the mines that have been most successful are the Wellington and Palmerston at Sherbrooke, the Ophir at Renfrew, the Albion at Montegu, the Eldorado at Wine Harbour and the German's mine at Waverley.



matter of milling much remains to be done. Some attention has been given to the batteries, but with but one or two exceptions little to the treatment of the tailings which undoubtedly do carry off much gold with the flowered mercury and iron pyrites. The actual loss is not known, for the practice of assaying is not resorted to, but that in many cases it is considerable, cannot be doubted.

The subletting of mines to tributers is still largely practised and while it has advantages when properly conducted, it has evils which become more apparent as it continues. In previous reports reference were made to the character of the work done by tributers, how that often the outcrops of the leads are stripped and made reservoirs for water, and the excavations often but partly packed with debris and but temporarily secured. In these respects the system is undoubtedly bad, but what legal measures to suggest that will remedy the evil without interfering with and crushing out adventurers from prospecting, are not easy to determine. The men who take the mines on tribute are irresponsible, and Arab like, they are forever wandering, trying new places, opening up old mines and again abandoning them.

Perhaps a remedy may be found by modifying the system of leasing, and by making the title of holders more secure, make them more interested in adopting a proper and more permanent mode of working.

## DISTRICTS.

### STORMONT.

In the spring work was resumed on areas 983 and 196 Block 1, E. D. On the property of the Consolidated Company, Mr. Hattie erected a winding engine and force pump. He also built a shaft house and put the mill in order. On the lead he has tunnelled to the west from the bottom of the shaft, which is 120 feet deep, and stoped overhead, obtaining fair returns for his labour.

Some little prospecting has been done on other areas in the district.

At the Johnston's brook mine a tunnel was started to intersect the lead 85 feet from the surface at a distance of 150 feet, but on driving a dyke was cut and the work was abandoned.

### WINE HARBOUR.

The Eldorado Company have suspended operations on the





this year. On the extension of the same belt on areas 750 and 751 on what is probably the Stryker lead mining has also been carried on. Other operations were conducted by Mr. Zwickle on areas 674, &c., and on area 615, Block 5. Mr. West has discontinued to mine on the lead lately worked by him on the Hayden and Derby property.

When work in the mines was dull during the summer, the miners turned over the dump piles and put much of the refuse with some of the surface soil through the mills obtaining sufficient gold to pay for the labour.

#### HARRIGAN COVE.

Further prospecting in this district has disclosed more leads to the south of the Galena belt. Regular mining has not yet been begun. At Shear's Point some 12 tons taken from the 20-inch lead yielded 5 ounces of gold; a return that it is expected would pay well were a mill conveniently situated for crushing the quartz.

#### FIFTEEN MILE STREAM.

This district in spite of its disadvantageous position has attracted several parties of prospectors who have laid bare many promising leads. For want of a good crusher little has yet been done in the way of actually testing the value of the quartz extracted, but it is hoped that the winter will enable material to be taken into the district and that in the spring one or both mills will be in working order. A good road over which supplies can be carried is much needed, for the lumberer's roads at present used are practically impassable during wet weather.

The only actual mining has been on the Jackson lead, which is one of the few large leads that yield well. Nearly two feet thick it carries 16 dwt. to the ton. Like the barrel quartz at Waverley, this lead has many rolls, but the rolls instead of dipping slightly or not at all as is generally the case in other places, dip at an angle of  $25^{\circ}$ . In some other leads of the district the rolls are nearly vertical.

#### CARIBOU.

Operations were resumed in this district, Mr. Caffery taking on tribute the Hyde property and Mr. Touquoy returning to work his own areas. Mr. Caffery has sunk the pumping shaft on the Burnett or Hyde lead, an additional 30 feet, making it have a

total depth of 124 feet. He has stoped 100 feet east, and 220 feet to the west, to within 10 feet of the bottom. Some distance east of the pumping shaft this lead is thrown 60 feet south, and was opened by four shafts 10, 5, 15 and 35 feet respectively in depth. It varies from  $1\frac{1}{2}$  to 8 inches in width, having an average of 4 inches.

A shaft 12 feet in depth has been sunk on the Slate lead. On the so called Reid block, Messrs. Touquoy and Caffery trenched about 50 feet in soil varying from 5 to 10 feet in depth and sank three shafts 15, 15, and 25 feet respectively. From the deepest, stopes were driven 8 feet and 10 feet to the east and west. The lode is the same as north No. 1 on Mr. Touquoy's property, but has diminished from 7 to 3 inches in thickness. On the same lead Mr. Touquoy sank three shafts to the depth of 10, 25 and 10 feet respectively and stoped from the middle one 15 feet east and west. On north lode No. 2 which is 8 to 18 inches thick, he sank 18 feet, increasing its depth to 84 feet and stoped 10 and 20 feet to the east and west.

On the Pioneer property about 100 feet of trenches were cut searching for leads. Explorations were also made on the old Cross lead which in spots carried 20 ounces to the ton and on the Flat lead which at one time paid well.

#### TANGIER.

The chief operations have been on Strawberry Hill, mining on the Leary, South and other adjoining leads having been abandoned. The new lead opened by Mr. Forrest last year on the Strawberry Hill he abandoned to work on the Dunbrack which lies about 200 feet to the south. The same lead is worked by Mr. Townsend and is the same that is spoken of when reference is made to the use of dynamite in the gold mines. Across the river Messrs. Ross and Miller have been working on the supposed extension of the Leary lead. A tunnel has been driven in from the shore which carries off the surface water. The shaft is down 30 feet and the stopes extend 40 feet along the lead which is 2 to 8 inches thick. The prospecting on the parallel leads, one of which is supposed to be the Fields has been suspended. No quartz from these leads has yet been crushed to test their value, and so it is talked of putting up a mill on the river.

At Mooseland Mr. Irvine has continued to employ some eight men on the property he has under tribute.

## OLDHAM.

The Hail lead on the Sterling property was steadily worked. This lead is very small but rich. It differs from ordinary leads in that it does not follow the lines of stratification. But it has a general dip north against the dip of the strata when passing through quartzite, until it strikes a bed of slate which it follows down for a short distance and then again breaks away across the strata. Where this vein is worked to the eastward it does not show at all on the surface. Some little work has been done on the Whitehead, Britannia and Blue leads, and prospecting generally throughout the district. Mr. Donaldson struck a fault at the bottom of his mine at a depth of 120 feet which a cross drift proved to have thrown the lead 18 feet to the north. He is now preparing to continue the sinking and to work the pumps by means of a set off from the main pump-rods. In the upper portions of the mine the stopes extend 500 feet along the lead.

## RENFREW.

A small amount of work was done in the Preeper lead and some prospecting on new ground by Mr. McClure but without much success.

## WAVERLEY.

On Laidlaw's Hill the tributers have continued to work the barrel quartz. They have two pits about 30 feet deep connected by a tunnel. From the lower one the water is pumped by means of a wire rope driven by a water wheel in the ravine close by. The quartz lies very flat and the workings have been both to the rise and dip of the shaft. A second company of tributers began in September to mine on the adjoining Morton property.

Work on the American Hill was suspended in the spring and Mr. McClure set his men to search for the continuation of the Union lead, which does not show at the surface to the eastward. It was found and has since been paying handsomely. The lead numerous rolls 4 to 8 feet apart dipping at a slight angle to the east. Its usual thickness is 8 inches but in the rolls it thickens to 15 inches.

## MONTAGU.

The Albion mine owned by Mr. Lawson and which he has been working for the last five years was closed during the summer, but has been since let to tributers who propose to further stope along



the intersection of the cross lead with the belt lead. The mine has yielded about 10,000 ounces of gold and is said to have been worked most profitably. During late years a plan of the workings that records the value of each parcel of quartz extracted, was kept. It is of interest, for while it shows how irregularly the gold is distributed in the lead, it also points out the extent and character of the so-called "gold streak." The richest portion of the lead at the surface was at the main shaft; in depth it trended to the westward. In the sinking of the main shaft, which reached a total depth of 300 feet, the quartz in the eastern stopes diminished in richness and thickness and ceased to pay the nearer to the shaft the further the sinking progressed. The western stopes also became impoverished in depth and the yield of paying quartz so small in quantity that it became no longer profitable to keep the mine free.

An idea may be formed of the expense of extracting a ton of quartz when it is stated that where the vein thinned it required about 100 square feet of stoping to yield one ton of quartz. Each square foot on the lead being mined on an average at a cost of 52 cents. In such a vein as this a yield of two or even three ounces to the ton is consequently unprofitable.

The mine was worked in a most systematic manner, and in such a way that the scaffolds above the lower stopes were below the next stopes in the series, thus enabling the miners to throw the slate and waste rock down and stow it the more easily on the scaffolds to the saving of much labour. The several shafts that are shown on the sketch plan were formed by leaving spaces unpacked with slate immediately above the centre of each stope.

The mill erected by Mr. Lawson is the best appointed in the Province. Blankets are used and the pyrites collected and specially treated in a revolving barrel. The tailings have been worked over a second time and the pyrites from exposure and a subsequent remilling reduced to  $1\frac{1}{2}$  ounces in value.

Symond's property has been let to tributers and they have been working the cross lead on area 1461. One lot of 18 cwt. yielded 19.7 ounces of gold. Tributers have also been working on Messrs. De-Wolfe's property, area 1166, mining merely on the surface. Other tributers have done a little work on areas 952 and 1457.

#### UNIACKE.

A few men worked in the summer on the McIntosh claims, stripping portions of the leads that had been left from former working down to the water level, a distance of 25 to 30 feet.











make a market for some of the small coal now all but valueless. Most of the Cape Breton coals are coking coals and from among so many some may be found to yield strong and suitable coke. And as experience has taught, and as the relative consumption of iron ore and coal would suggest, it is better to take the ore to the fuel than the fuel to the ore, we must hope some day to see iron works established on the Bras d'Or, or at Sydney, or at Louisburg, some centre where ores from different localities may be brought and mixed at the furnaces. Although at the present time the iron trade of this seaboard is dull, and the immediate prospects of the mines and furnaces in the United States is anything but encouraging, still it is a business that must shortly revive and eventually pay in this country, which possesses the requisite natural advantages, cheap transit, abundance of coal, iron ore and limestone.

During the year that has passed an unusual degree of activity prevailed among prospectors searching for beds of iron ore and discoveries have been made in several sections of the country that promise to be of future value.

Professor How in his "Mineralogy of Nova Scotia", classifies the information gained in 1868, respecting the position and extent of the Iron deposits of the country. Since then new discoveries and further explorations have been made, and the extent of many deposits shown to be considerable.

In Cape Breton at the Indian Reserve, Whycocomagh, some nine deposits have been exposed as interbedded with the country slates, and proved to extend a few hundreds of yards. They extend much further, but the surface being heavily covered with soil and trees has made the work of exploring tedious and expensive. One bed of magnetic ore, nine feet thick yields, it is reported, 46 per cent. of metallic iron, another hematite bed six feet thick, carries 56 per cent. of iron. At Big Pond on the East Bay of the Bras d'Or lake, a bed of hematite some nine feet thick has been lately opened and proved to extend for at least half a mile. An analysis shows it to contain 61 per cent. of iron. Very promising looking boulders of hematite ore have been found at Little Lorraine near Louisburg but no explorations have, it is understood, yet been made. Clay ironstone is known to exist in the coal measures of the Sydney field near the town of Sydney and at Schooner Pond in considerable quantity. The largest beds of this ore that have yet

been noticed are found near Mabou and by analysis contain 42 per cent. of iron. An iron ore containing much manganese, is reported to exist near Loch Lomond, Cape Breton.

In Nova Scotia proper boulders of ore have been found in several

northwest side line obliquely across the area to the property of J. Kennedy. Overlying it, is a band 12 feet wide and underlying it another 8 feet wide.—Area No. 6. The vein of specular ore already proved on the eastern side of this area was further examined by trial pits, and the width of the main vein found to vary from 6 to 20 feet while the side veins in places thickened to 2 feet. The continuation of the Weaver bed seems to extend all the way across area 22, giving to the deposit of specular ore a total length of some two miles.

On the area No. 102, a five foot vein of hematite was traced for a mile and a half along the bank of a brook that empties into the East river at the upper settlement. The continuation of this vein is also supposed to be found on area No. 21. Its general course is north and south. On area No. 7, a new bed of hematite 4 feet wide has been discovered. It has the same course N. 10 E. as the Blanchard vein which has been further proved. On area No. 8, when exploring for the Webster ore a vein of good ore 10 inches thick was struck ten feet down, which did not show at the surface. The Webster vein extend nearly three miles. At Sutherland's River the spathic ore has been further explored and indications of its existence extends for over half a mile. The results of these explorations puts beyond doubt the great extent of the Springville deposits, and the value of some of the ores is shown in the appended table of analyses. Much money has already been expended in developing the district, and strong hopes are now entertained that a company with sufficient working capital will shortly be incorporated to establish extensive iron works in the neighborhood.

The Annapolis Iron Mines at Clementsport, have passed into the hands of the New York and Nova Scotia Iron and Coal Mining and Manufacturing Company, who have employed some eight men only during the year mining ore. The furnace is out of blast undergoing repair. It is contemplated establishing a foundry and forge in connection with these works.

The Acadia Iron mines at Londonderry have also changed hands, and become the property of the Steel Company of Canada, (Limited), having a capital of £500,000 sterling. According to the prospectus, the property consists of 55 square miles of freehold lands together with the mines there under and the works and



buildings thereon. It was purchased for £82,000 in cash and £120,000 worth of fully paid up founder's shares. During the year but 1069 tons were mined, the chief operations being on new ground, cutting, exploring trenches, and driving adits.

A new level is being driven at Martin's Brook which will cut the main deposit 70 feet below No. 6 level of the present workings. It will be about 1700 feet long before striking the ore and it may possible cut a new deposit which is suspected to exist from the occurrence of boulders of ore in the soil some distance from the present workings. A second series of deposits was proved to exist 500 yards to the north at the foot of the Sugar Loaf hill. Some exploring was also done from the ravines on Pine and Cumberland brooks.

On the Folly mountains numerous trenches were cut across the strike of the ore deposits, and the thickness proved in places to be 30 and 40, and even 120 feet. Adits here also have been started in the ravines to tap the surface water of the lode.

The blast furnace, burning charcoal, was kept running during the year and smelted 1462 tons of metal from 3097 tons of ore. The steel works were closed and the foundry was alone utilized. Some 281 tons of ore were shipped to England as a sample. On an average during the last six months 218 were employed.

The ore from these deposits is considered more than usually free from sulphur and phosphorus and especially suitable for steel making. For this purpose, the company which now possesses the property was formed, and while they propose to work the main bulk of the ore by Siemens' Direct Process, for the production of iron and steel, they also intend to erect two large blast furnaces to use coke and produce foundry pig. Three of Siemens' furnaces are already built and they will probably be lighted in April. As their construction and principle of operation is so different from the familiar blast furnace, a short general description will doubtless be of interest.

Each furnace may be said to consist of three distinct parts, the gas producer, the regenerator, and the furnace proper. The gas producer is a rectangular fire-brick chamber, 6 feet by 12 feet, by 10 feet high, with one end inclined at an angle of about 45° to a grate, on which the fuel falls in a thick bed from a hopper on the top of the incline. Air is admitted at the grate, and on burning its oxygen unites with the carbon of the fuel and forms carbonic

acid gas, which rises slowly through the ignited mass, taking up an additional equivalent of carbon and thus forming carbonic oxide. The heat thus produced distils off carburetted hydrogen and other gases, and vapours from the fuel as it descends gradually toward the grate and these with the carbonic oxide, the inert nitrogen of the air, and any unreduced carbonic acid are finally led off by the gas flue to the regenerator. The ashes and clinkers from the grate are removed at intervals of one or two days. A pipe to the ash pit supplies a little water which is decomposed as it evaporates and comes in contact with the incandescent fuel, thus forming hydrogen and carbonic oxide which serve to enrich the gas. A sliding damper enables any one of the gas producers—of which there are six—to be at any time shut off from the main gas flue.

To prevent a combustion of the gas in the flues by the admission of fresh air through the crevices in the brick work a slight outward pressure is maintained. This is effected by carrying up the hot gas through a short brick stack to a horizontal sheet-iron tube, "the elevated cooling tube," from which it passes down directly to the underground brick flue leading to the regenerators, forming a syphon having both limbs equal, but one filled with a heavier gaseous fluid than the other. For the gas rising from the producer at a temperature of 1000° Fahr., is cooled as it passes along the tube and consequently the descending column is denser and heavier and overbalances the ascending column.

The regenerators are worked with two pairs to each furnace. Each regenerator is a chamber packed with fire brick, separated so as to allow of the free passage of air or gas between them. The gas ascends through one chamber whilst air ascends through the neighboring chamber and both are conducted by passages to the furnace, where mingling, they burn, producing the heat due to their chemical action. Then passing through the furnace, they, (the combined gases), by similar passages into the remaining pair of regenerators from above downwards they heat them intensely, especially the upper part and then travel on in their cooled state to the chimney. Every twenty minutes the course of the air and gas currents is reversed by means of valves. The chambers heated by the waste gases, heat on the reversal of the current the entering gas and air and are thus alternately heated and cooled. The heat evolved by the combining gases is considered to be about



4000° and the waste heat after passing through the regenerator has had its temperature lowered to 300° Fahr. By the alternate reversing of the current course the temperature is accelerated until the furnace acquires the required heat. Were no cold materials put in to abstract the heat, the temperature would continue to increase as long as the furnace holds together and the supply of air and gas is continued.

Two of the furnaces are rotators specially modelled by Mr. Siemens. They are 9 feet in diameter and 8 feet long and are revolved by machinery. The third is a melting furnace.

The advantages of this process for puddling are that the heat can be raised to an almost unlimited degree, that the flame can be made at will, oxidising, neutral, or reducing, without interfering with the temperature that the in-draughts of air and cutting

It would appear that subsequent to the final metamorphism of the fossiliferous into the present compact limestone the galena was deposited and probably from the percolating waters that produced the metamorphism. Wherever opened the limestone seems equally charged with galena, the upper equally with the lower beds and in places hundreds of feet apart. Should it be proposed to work this deposit, no hesitation on the score of quantity of ore, such as it is, need be entertained. The proved area that can be worked by simple quarrying is ample to warrant the erection of extensive works if only a process can be found to make the small percentage pay. Hand specimens may be found to yield 17 per cent. but the rock requires picking to give an average of three per cent. Analyses of the ore give  $11\frac{1}{2}$  ounces of silver to the ton of pig lead.

The grains of galena are so fine and intimately blended with the limestone that trituration will be necessary for separation. This can only be done at considerable expense and at a proportionately large loss of ore. It is not likely that any further steps will be taken until some practical test has been made at some existing lead works.

Disseminated crystals of galena are found in the limestone near Sydney and Arichat, at the latter place in small pockets, but nowhere in any appreciable quantities. Boulders of lead ore have been found near Pembroke in Colchester County, but not in situ. A narrow vein containing galena has been found near Port Hood, C. B., which requires further exploration before its value can be estimated.

#### *FREESTONE.*

New Freestone quarries were opened at Wallace and Pictou, but the total quantity exported was less than that shipped last year. From Wallace Mr. Battye sent 1850 tons of building stone to the United States and 2763 tons of second class to Prince Edward Island. Fifty five men were employed at his quarry and works. He has improved his shipping facilities by building a new wharf and purchasing the steam tug Lion to tow vessels in and out of port. He has opened a new quarry and put up a new hoisting engine. Of the other quarries no information has been obtained. The total shipments from



	TONS.	VALUE.
Wallace .....	6863	\$17.113
Pugwash.....	308	2.050
Pictou.....	188	1.448
Merigomish.....	150	1.500
Tatamagouche.....	25	100
Windsor.....	130	10.000
	<hr/> \$7664	<hr/> \$23211

Most of the grindstones made in the Province are quarried by A. Seamen & Co., at the Lower Cove near the Joggins. A few at Pugwash and Tatamagouche.

Tatamagouche, 13 pieces.....	\$ 126
750 tons Lower Cove Stone at \$16.....	12000
350 tons Shore Cove Stone at \$12 .....	4200
Scythe Stones 194 gross .....	776

#### *LIMESTONE.*

Pugwash is the only place reported to have shipped limestone to the amount of 448 tons. Many small quarries exist throughout the county, which supply limestone to the kilns. Lately kilns have been built to burn the marble of George's river and the Marble Mountain of Cape Breton, and an excellent quality of lime is produced.

#### *BARYTES.*

There is quite a demand in the United States for barytes of good quality to be used as an adulterant. At many localities this mineral is found, as at Port Hood, Stewiacke, Antigonish and River John at which latter place a bed of 4 feet wide is reported to crop out in several places. It is only mined however at Five Islands, from whence 208 tons were exported.

#### *PLASTER.*

New quarries of this material have been opened on the Bras d'Or, Cape Breton, and preparations are now being made to ship

largely during the coming season. The shipments in 1874 were from

Windsor.....	63,370
Hantsport.....	500
Chevirie.....	23,095
Walton .....	1,640
Maitland.....	6,775
Halifax.....	330
Parrsborough.....	1,320
Antigonish.....	6,50
Baddeck (Bras D'Or).....	6,560
	<hr/>
	104,240 \$104,240

#### SALT.

In several places in the Province, and generally, if not invariably, in the lower carboniferous measures, salt springs are known. Attempts to manufacture salt from the brine of the springs near Antigonish and Spring Hill have been made, but hitherto neither very extensively nor profitably. A second attempt is now contemplated at Spring Hill, where the circumstances have been of late improved, by the opening of the neighbouring coal mines and the completion of the railway, giving cheap fuel and transit.

The strength of the brine from this spring usually records 30° to 35° on the salometer, or equal to a yield of one bushel of salt from 72 to 82 gallons of brine, the variation in the density being caused by the infiltration of surface water which increases in quantity during wet weather, and decreases during dry. At Syracuse, New York, the brine at the surface only registered 15° to 25°, but on going down a depth of 400 feet its strength rose to over 65°. At Goderich and Seaforth, Ontario, rock salt was struck at a depth of 1050 feet.

It is estimated that with the cheap fuel to be got at Spring Hill a ton of salt should be made for \$1.50 ; now as the price at Halifax is about \$7.00, there should be left after paying freight and interest a handsome profit.

The Nova Scotia Salt Works Company made a small quantity of salt at their works situated on the outskirts of the village of Antigonish. They have all the necessary plant to do a large business, but the wells are at present out of order. In 1873 a new bore hole was sunk to a depth of 600 feet when it caved in and was abandoned. The first well was then bored deeper

and a plentiful supply of brine was struck, which indicated 35° by the salometer. After pumping for some time from this well boiling was commenced but it was soon discontinued on account of surface water mixing with the brine. It is to be hoped that the hole will be properly tubed and the surface water kept back, for the business of salt making might be made a profitable one, since something like 50,000 tons are annually required in the Maritime Provinces.

TABLE OF FATAL ACCIDENTS—1874.

Date.	Name.	Age.	Mine.	Cause.
th 17 . . .	Hector Cummins . . . . .	13	Vale . . . . .	Runaway rake in Slope
28 . . .	Martin Foley . . . . .	18	Intercolonial . . . . .	" " "
1st 17 . . .	{ John Potts . . . . .	38	Albion . . . . .	Rope breaking in shaft.
	{ W. C. Jackson . . . . .	36	" . . . . .	" " "
20 . . .	Joseph Thomas . . . . .	43	Londonderry (Iron) . . . . .	Explosion of powder
28 . . .	Michael Cameron . . . . .	30	Victoria . . . . .	Fall of coal
29 . . .	William Stewart . . . . .	23	Nova Scotia . . . . .	Fall of coal
ember 5 . . .	Charles Lockhart . . . . .	36	Scotia . . . . .	Fall of coal

**ACCIDENTS**  

---

**FALLS OF COAL.**—This most fruitful source of accident occasioned three deaths, and as is often the case such was brought about by the recklessness or temporary carelessness of the persons who suffered or their immediate associates.

**Accident No. 5**—In the bord in which M. Cameron worked, two shots were put in, on the day of the accident, and fired, but the coal did not come away freely so that that shaken had to be pulled down with the pick. When Cameron had taken off all that he thought was loose he stood with his back against the face. Then it was that a block of coal some 7 feet long by 2 feet deep became detached, and, in falling, struck Cameron on the head and back. His injury was at first supposed to be slight, but he being a delicate man was so affected that he died within the week.

On the following day three men were removing pillars in the Nova Scotia pit and were working where, by the wasting away of the fireclay parting, a block of coal was left unsupported. To bring it down it was thought safer to put in a shot than to use wedges. A hole for this purpose was bored, and in the meantime some of the loose coal beneath it was removed. The workmen did not consider it safe to do so, but decided to risk it. While so occupied the block came away toppling over one man and falling on the back of Stewart, instantly killed him.

**No. 7.** Charles Lockhart began on the morning of December 5th, to continue a holing that had been left unfinished the evening before. The holing was 20 inches deep and 9 feet in length. He had barely resumed work in the middle of the bord when a part of the fall came away and crushed him.

In reporting this accident it was mentioned that no warning was given, and that a peculiar slip in the coal occasioned the fall. It is continually the case, that a peculiar slip, an unusual type or an unexpected fracture are reported to occasion falls that produce such accidents. It is true they may be rarely seen in individual pits but yet they are continually occurring in mines, and are noticed year after year as a source of accident. Such accidents can be guarded against by the use of spraggs in the holing, and their use should be insisted on by overmen. Five other serious though not fatal accidents were reported as due to falls of coal and stone.



**ACCIDENTS IN SLOPES**—Two fatal accidents are reported to have occurred to lads in slopes. No. 1 occurred at the Vale Colliery, and was either the result of bad workmanship or from the use of inferior iron in a bolt that connected the shackle on the hoisting rope to the draw-bar of the tub. For on the 17th of March, when a trip had started up the slope and was about 36 feet from the bottom, the bolt broke, the tubs descended

the buckets, and had not been subjected to a weight greater than that of the iron bucket and the two men. It was rove on the day of the accident in perfect confidence of its strength, and yet it parted with a weight but one-thirtieth of its breaking strain. An examination of the break showed but one wire with a bright fracture. All the rest of the 36 wires in the rope were either rusted through or showed a short and blackened face of fracture, so that the bucket previous to the entrance of the men must have been suspended by one wire and the hempen core.

The body of Jackson fell 600 feet into a tank of water at the top of the first lift of pumps, two-thirds of the way down the shaft. Potts was caught together with the bucket by the first set of buntons, 30 feet down, and lay there for some minutes, while men hastened for a rope to go to his assistance. But they returned too late, for the poor man in his struggles slipped off and carried the bucket with him. His body was heard to bound from side to side of the shaft as it fell to a depth of 450 feet, where it lodged, completely denuded of clothing.

At the inquest the facts stated above were brought out and the conclusion arrived at by the jury respecting the cause of the accident appears most credible. On the rope at or near the point of rupture untarred marline was wound as a 'token' to the engine tender of the position of the men in the shaft. Underneath this token the corrosion is supposed to have occurred. Every time the rope was used, the token would get wet and being untarred would allow the rope underneath to retain moisture, and cause it to dry slowly when wound away on the engine draw. This alternate wetting and slow drying underneath the marline, would allow the wires to rust away unnoticed. Had the corrosion occurred at any other spot it could hardly have escaped the observation of the men who twice handled it each time it was required. There were three other tokens on the same rope which being higher up, were seldom exposed to the same wetting and drying, as the lower one, or the circumstances may not have been quite similar. The lower one may have become from some cause slightly slack, or the upper ones may have been put on where the rope was better protected by a coating of tar. Be that as it may, the engineer was unable to see any difference in the appearance of the rope where the upper tokens had been. The jury, however, thought there was sufficient evidence to convince them that the token was



the cause of the corrosion, and they therefore recommended that such tokens be in future occasionally renewed.

The rope previously used had been on for four years but as the socket on the end of the rope had required on several occasions to be replaced and the end consequently to be cut off, the tokens

deputy was specially prepared to warn the men that they would and some gas to brush out on that occasion.

At the Acadia in July a man in the north level of the new drift hung his lamp high close to a hole he was about to stem. After a short time some gas, which had not been previously noticed to collect there, fired at his lamp and ignited the powder, which burnt one man severely and another slightly. Safety lamps were in consequence used while driving the continuation of the levels.

At the Cage Pit of the Albion Mines, two men were slightly burnt in December from gas that had accumulated in the lodgment. Gas had never been known before to gather there though the place had been for some time boarded up to retain the exhaust steam from the force pump. Arrangements have since been made to ventilate the lodgment and condense the exhaust steam in the suction pipe of the pump.

**EXPLOSION OF POWDER.**—One fatal accident from this cause was reported—No. 4. It occurred in a level of the Acadia Iron Mines at Londonderry. The deceased Jos. Thomas prepared two shots. The fuse of one he lighted and on its exploding he returned to the face of the level intending to fire the second. Just as he did so it exploded and fatally injured him. It is supposed the fuse of the second caught fire from the explosion of the first. The practice of preparing two shots and only firing one at a time is most reprehensible and should never be allowed. Two slight accidents were reported to have occurred from loose powder falling on the pavement and being ignited by sparks from the lamps. A more serious one was produced by loose powder on the floor of a cabin igniting a cartridge which in turn fired a 5 lbs. tin of powder.

**MISCELLANEOUS.**—Several accidents were reported as having produced serious though not fatal injuries. Among them one occurred at New Cambellton where two lads while scuffling in the engine house knocked against the driver who fell, and in falling got his arm crushed between the cogs of the engine then in motion. This accident happened before the Mines Regulate Chapter came in force. At Sydney a water blast occurred at the time when a miner was passing a cross cut and he was struck by the mud and water and severely bruised by some stone which simultaneously fell from the roof.



**TABLES.**—The tables showing the average quantity of coal cut per day, the yield per man, the percentage of sales to produce, &c., are well worthy of examination and comparison with those of last year. The percentage of colliery consumption to the produce as a whole is high. In some cases it gives an idea of the cost of mining, and the comparative cheapness of working new winnings with more modern machinery to the older establishments. A comparison of the total days' labour with the produce is also suggestive of the difference in the expense of working the several seams. These tables also show that collieries producing much below their capacity are worked at a higher rate per ton. The method of striking the averages may not in every case be the same, but the variation can by no means account for the noticeable differences at various collieries.

The extract from the last Custom House report, just issued, shows that the Dominion of Canada imports from the United States, more than double the quantity of coal than is exported to that country and that the value of the imports is nearly three times that of the exports.

I have the honour to be,

Sir,

Your obedient servant,

HENRY S. POOLE.

The Hon. ROBERT ROBERTSON,

Commissioner of Public Works and Mines.



---

to Hoyt,  
 Cunard & Co.  
*James Hudson.*  
 Messrs Simpson.

. B. Moore.  
*John Greener.*  
 F. W. White.

lowers Archibald.  
*Charles Archibald.*  
 Macqueen.

id McKeen.

---

COAL TRADE BY COUNTIES.

TABLE A.

	CUMBERLAND.		PICTOU.		CAPE BRETON.		VICTORIA.		TOTAL.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter - - - -	11,582	7,363	97,613	19,141	150,433	8,548	883	.....	260,511	35,052
2nd Quarter - - - -	11,459	10,500	119,172	89,829	123,943	88,956	1,450	864	256,024	190,149
3rd Quarter - - - -	12,280	17,294	134,572	171,788	84,892	155,308	2,467	2,298	234,211	346,688
4th Quarter - - - -	16,259	14,442	59,519	77,168	45,000	84,204	1,196	1,424	121,974	177,238
Total - - - - -	51,580	49,599	410,876	357,926	404,268	337,016	5,996	4,586	872,720	749,127
1873 - - -	27,592	26,345	383,949	333,984	639,085	520,189	841	588	1,051,467	881,106
1872 - - -	15,750	14,153	422,716	388,417	437,326	380,274	5,158	3,070	880,950	785,914

GRAND.	TOTAL.
0	61,646
11	153,319
17	214,985
22	162,269
37	78,841
40	55,696
42	41,948
54	188,335
..	47,844
..	5,077
..	4,152
46	749,127
53	881,106
84	785,914

## COAL—GENERAL STATEMENT.

1874.	Produce.	Sales.	Colliery Consumption.
1st Quarter - - - - Tons.	260,511	35,052	32,431
2nd " - - - - "	256,024	190,149	29,082
3rd " - - - - "	234,211	346,688	29,794
4th " - - - - "	121,974	177,238	28,275
Total.....1874.	872,720	749,127	119,582
Total.....1873.	1,051,467	881,106	108,398
Total.....1872.	880,950	785,914	101,341

N. B.—Stock on hand at the end of the year, 93,000 Tons.

## COAL SALES.

Markets.	1st Quarter	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1874.	1873.
Nova Scotia - -						
“ Land sales	14,967	8,363	13,836	24,480	61,646	60,963
“ Seaborne -	2,807	35,287	74,389	40,836	153,319	154,333
Total - - -	17,774	43,650	88,225	65,316	214,965	215,295
Quebec - - - -	...	61,785	84,138	16,346	162,269	187,059
New Brunswick -	6,761	17,001	30,727	24,352	78,841	68,217
Newfoundland -	693	15,491	24,039	15,473	55,696	55,867
P. E. Island - -	...	11,117	21,067	9,764	41,948	26,840
United States -	5,490	35,480	82,995	14,370	138,335	264,760
West Indies - -	4,334	4,917	13,338	25,255	47,844	54,213
South America -	...	...	595	4,482	5,077	1,885
Europe - - - -	...	708	1,564	1,880	4,152	6,976
Total - - -	35,052	190,149	346,688	177,238	749,127	881,106



.....





## COAL SALES IN NOVA SCOTIA FROM 1785 TO 1874, (Inclusive.)

Year.	Sales.	Total.	Year.	Sales.	Total.
1785	1,668	14,349	1831	37,170	839,961
1786	2,000		1832	50,396	
1787	10,681		1833	64,743	
1788			1834	50,813	
1789			1835	56,434	
1790			1836	107,593	
		1837	118,942	1,533,796	
		1838	106,730		
		1839	145,962		
		1840	101,198		
		1841	1		
		1842	1		
		1843	1	2,399,829	
		1844	1		
		1845	1		
		1846	1		
		1847	2		
		1848	1		
		1849	1	4,927,339	
		1850	1		
		1851	1		
		1852	1		
		1853	2		
		1854	2		
		1855	2	91,527	
		1856	2		
		1857	2		
		1858	2		
		1859	2		
		1860	3		
		1861		140,820	
		1862			
		1863			
		1864			
		1865			
		1866			
		1867		13,061,706	
		1868			
		1869			
		1870			
		1871	596,418		
		1872	785,914		
		1873	881,106	3,012,565	
		1874	749,127		
			Total....	13,061,706	

## SUMMARY.

1785 to 1790	14,349	1831 to 1840	839,961
1791 " 1800	51,048	1841 " 1850	1,533,796
1801 " 1810	70,452	1851 " 1860	2,399,829
1811 " 1820	91,527	1861 " 1870	4,927,339
1821 " 1830	140,820	1871 " 1874	3,012,565

NOTE.—Tables purporting to show the total quantity of coal produced in Nova Scotia have been from time to time published, but in all errors of greater or less magnitude have crept in as the different valuations given to the chaldron in the several sections of the country have been overlooked. The above table is probably as nearly correct as can now be determined and if 15 per cent. be allowed for colliery consumption 1,768,622 tons must be added making the total quantity actually raised 14,782,330 tons.

## PORT OF HALIFAX.

*Exports of Minerals:—*

	Tons.	1874. Value.
Coal . . . . .	7,615	\$30,963.00
Plaster . . . . .	330	594.00
	<u>7,945</u>	<u>\$31,557.00</u>

*Imports of Coal:—*

	1870.	1871.	1872.	1873.	1874.
Anthracite, (United States)	1024	1577	3715	5605	4494
Gas Coal . . . . .	1934	240	...	...	1131
Cumberland . . . . .	..	..	..	..	503

## PORT OF ST. JOHN'S.

*Imports of Coal:—*

	1873.	1874.
United Kingdom . . . . .	7,075	7,752
Nova Scotia . . . . .	40,220	29,863
United States . . . . .	348	268
Total in Tons . . . . .	<u>47,643</u>	<u>37,883</u>

## COAL EXPORTED FROM N. S. TO NEW YORK.—1874.

Pictou . . . . .	3,269
Sydney . . . . .	1,488
Glace Bay . . . . .	667
Port Caledonia . . . . .	21,230
Blackhouse & Crow Bay . . . . .	12,103

STATEMENT OF THE NUMBER AND CLASSES OF PERSONS EMPLOYED, AND AVERAGE RESULTS  
AT EACH COLLIERY DURING THE YEAR ENDED 31<sup>st</sup> DECEMBER 1874.

COLLIERY.	UNDERGROUND.				SURFACE.			Non-structure- loss.	Total.		Ave. No. of days per person.		Average of tons outlet.	Ave. tons per day per cutter.	Ave. quan- tity shipped per day.	Horse- power.		Plus Worked. days.
	Men.	Boys.	Other.	Days	Men.	Boys.	Other.		Days	Per cent.	Under- ground.	Sur- face.						
B. & A. Cumberland.	1		24	0		156		6	156	26	1.5	27	2.2	30			12	
Lawrence	1							2	284									
New Dunsford.								2	284									
Beattie	5	2	1	4	1	2807		14	2519	210	1.38	246	2.0	18			103	
South Joggins	20	6	3	10	3	10495		77	10572	237	2.44	876	2.3	73		8	226	
Spring Hill	43	18	3	30	4	18165		124	3476	281	2.84	778	2.7	126		2	206	
B. K. & L. Hartt & Co. & E. Co.						470		8	378	53								
Acadia.	163	60	21	94	8	36361		385	37051	274		672	3.1	485		5	228	
Albion Mines.	206	60	41	124	38	84160		694	84854	265		285	3.5	1271		20	246	
International	85	42	11	44	21	27109		253	27362	301		727	3.0	330		30	295	
Mitchell & Co.	4			2	1	375		8	632	54		84	1.6	8		1	32	
Nova Scotia.	71	23	14	46	10	21563		185	22657	287		80	2.8	217		5	302	
Vale.	108	30	5	32	2	10191		203	27634	189		388	3.0	165		3	238	
Black-houps.	68	10	23	70	6	18374		219	20292	130		425	2.8	112		9	145	
Caladonia.	51	7	12	31	5	16117		127	17393	213		771	3.0	204		6	146	
Online.	41	1		1		12		20	4	4								
Emery.	41	8	4	61	5	11645		14	4333	137		589	2.0	163		3	152	
Garling.	45	30	4	16	2	17574		3	457	246		445	1.5	119		2	158	
	248	46	25	25	3	13467		215	46177	186		878	3.0	138		11	171	
	576	26	48	52	13	22775		190	40221	194		432	2.2	192		7	163	
	100		1			100		10	203	36		35				1	186	
	46	11	1	23	4	17072		123	33370	248		791	3.2	197		14	193	
	48	11	1	31	8	13548		146	29218	202		410	3.0	120		10	163	
	23	11	1	12	2	4316		41	7312	153		304	1.0	43		2	104	
	23	11	1	11	13	33006		167	28824	174		512	3.0	276		2	104	
	23	11	1	31	2	324		42	1948	54		512	3.0	276		2	104	
Ontario	192	10	10	61	24	53185		605	181748	232		202	2.5	171		5	27	
Reserve	30	13	4	9	5	7940		81	17931	199		274	2.5	173		5	293	
Schoon's Pond																		
Sidney Mines																		
Victoria																		
Black Rock	2	1	2	2	1	35		10	185	26		7	0.5	21		5	27	
New Campbell	34	18	4	14	6	4587		96	11670	130		134	1.2	21		5	293	
	1681	478	349	463	193	388503		353	86391	4292	213	223	2.5	165		179	221	

## COLLIERY CONSTRUCTION ACCOUNT.

COLLIERY.		Shafts.	Slopes.	Adits.	Machinery.	Colliery Buildings.	Dwellings.	Surface Works.	Railways.	Wharves.	Processing.	TOTAL.
Black	Cumberland Co.	...	...	...	...	...	...	...	...	...	1005 00	\$1005 00
New Dominion	...	...	...	...	...	...	...	...	...	...	250 00	250 00
Scotia	...	...	80 00	...	...	...	...	...	...	...	...	80 00
South Joazeiro	...	...	...	...	888 00	281 00	240 00	...	...	650 00	...	2009 00
Spring Hill	...	...	8023 47	2045 00	9900 00	1050 00	2500 00	5079 43	548 00	...	...	28445 90
Spring Hill & Parramore C. & R. Co.	...	...	168 89	...	...	604 00	593 49	1157 93	1024 00	...	1666 60	5007 91
Acadia	Pictou Co.	...	...	...	5613 89	1477 45	6324 03	1296 00	822 14	49 93	32 20	15646 24
Albion Mines	...	...	...	...	4211 52	6762 28	...	2888 08	...	...	...	14478 77
Intercolonial	...	161 88	8309 20	883 79	6191 57	1370 81	2221 44	417 58	...	...	...	18586 27
Mitchell & Co.	...	...	...	...	...	9 00	76 00	...	...	...	...	85 00
Nova Scotia	...	...	1130 00	307 00	1774 00	2737 00	8403 00	188 00	1146 00	281 00	451 00	42800 00
Vale	...	...	1200 00	649 00	5200 00	...	...	1284 00	21691 00	4374 00	...	16795 86
Black House,	Cape Breton Co.	...	...	...	...	...	...	...	...	...	...	8662 62
Oaledonia	...	...	...	1447 05	1520 24	...	3188 63	706 70	...	...	112 25	2860 86
Emery	...	265 06	704 40	321 50	182 20	75 00	...	700 45	...	...	...	2705 95
Gardiner	...	1780 00	...	350 00	180 35	95 60	300 00	...	...	...	...	21929 72
Glouce Bay	...	16324 54	...	185 63	200 00	2584 92	...	...	2524 63	...	...	11786 00
Gowrie	...	186 00	40 00	140 00	2060 00	...	600 00	510 00	1950 00	6300 00	...	195 00
Ingraham	...	75 00	...	85 00	35 00	...	...	...	...	...	...	982 83
International	...	...	716 50	21 25	...	...	...	...	...	...	...	10692 46
Lingan	...	...	803 00	2356 37	962 09	6000 00	...	...	450 00	131 00	...	447 00
Ontario	...	...	...	253 00	63 00	...	22 00	...	...	...	...	1814 30
Reserve	...	...	1122 30	...	286 00	...	82 40	323 60	...	...	...	129 40
Schooner Pond	...	129 40	...	...	...	...	...	...	...	...	16 00	16 00
Sydney Company	...	...	...	...	...	...	1074 91	...	8182 45	4906 76	...	28869 32
Sydney Mines	...	14653 81	...	41 39	...	...	...	...	...	75 00	...	1807 00
Victoria	...	...	345 00	787 00	600 00	...	...	...	...	40 00	...	104 65
Black Rock,	Victoria Co.	...	...	12 00	20 00	...	...	32 65	...	...	...	2662 00
New Campbellton	...	...	1193 00	32 00	...	466 00	281 00	141 00	184 00	156 00	209 00	...
		33575 69	23825 76	9874 59	36140 96	20685 35	31784 90	14066 07	38929 11	34004 63	3742 05	247529 06

**EXTRACT.**  
**CUSTOM HOUSE REPORTS.**  
**COAL AND COKE.**

Imports, 1873-'74.	Tons.	Value.
Great Britain.....	133,603	\$724,012
United States.....	671,224	3,081,341
	804,827	3,805,353
Exports, 1873-'74.		
Great Britain.....	331	1980
United States.....	316,423	1,054,467
Other Countries.....	101,603	287,292
	418,357	1,343,739

*NOTE.*—During the year 1874 Nova Scotia sent only 138,385 tons to the United States.

**IRON ORE ANALYSES.**

	Londonderry.		Ankerite.		Pictou—Spathic	
	White.	Yellow.	Brown.		Sutherland's River.	
Carbonate of Iron....	2.32	23.45	20.30	18.59	88.59	88.48
Carbonate of Lime....	5.40	43.80	49.20	51.61	1.53	2.34
Carbonate of Mang'se ..	..	.80	..	..	2.85	1.85
Carbonate of Magnesia	2.20	30.80	30.20	28.67	3.48	5.82
Silicia.....	.5	.10	..	.13	2.70	1.51
Sulphate of Lime.....	..	..	..	..	.55	..
	99.70	98.95	99.70	99.93	99.70	100.00



	XXI.	XXII.	XXIII.
93	68 21	50 14	69 17
94	.....	24 74	undd
95	.....	3 68	undd
96	.....	35	undd
97	1 22	4 70	undd
98	8 04	4 81	18.94
99	.....	20	.....
100	trace.	( 08)	( 65)
101	.....	21	1 83
102	trace	( 09)	( 79)
103	1 53	11 06	..
104	.....	05	..
105	.....	00 100 00	.....
106	.....	.....	.....
107	.....	.....	.....
108	.....	.....	.....
109	.....	.....	.....
110	.....	.....	.....
111	.....	.....	.....
112	.....	.....	.....
113	.....	.....	.....
114	.....	.....	.....
115	.....	.....	.....
116	.....	.....	.....
117	.....	.....	.....
118	.....	.....	.....
119	.....	.....	.....
120	.....	.....	.....
121	.....	.....	.....
122	.....	.....	.....
123	.....	.....	.....
124	.....	.....	.....
125	.....	.....	.....
126	.....	.....	.....
127	.....	.....	.....
128	.....	.....	.....
129	.....	.....	.....
130	.....	.....	.....
131	.....	.....	.....
132	.....	.....	.....
133	.....	.....	.....
134	.....	.....	.....
135	.....	.....	.....
136	.....	.....	.....
137	.....	.....	.....
138	.....	.....	.....
139	.....	.....	.....
140	.....	.....	.....
141	.....	.....	.....
142	.....	.....	.....
143	.....	.....	.....
144	.....	.....	.....
145	.....	.....	.....
146	.....	.....	.....
147	.....	.....	.....
148	.....	.....	.....
149	.....	.....	.....
150	.....	.....	.....
151	.....	.....	.....
152	.....	.....	.....
153	.....	.....	.....
154	.....	.....	.....
155	.....	.....	.....
156	.....	.....	.....
157	.....	.....	.....
158	.....	.....	.....
159	.....	.....	.....
160	.....	.....	.....
161	.....	.....	.....
162	.....	.....	.....
163	.....	.....	.....
164	.....	.....	.....
165	.....	.....	.....
166	.....	.....	.....
167	.....	.....	.....
168	.....	.....	.....
169	.....	.....	.....
170	.....	.....	.....
171	.....	.....	.....
172	.....	.....	.....
173	.....	.....	.....
174	.....	.....	.....
175	.....	.....	.....
176	.....	.....	.....
177	.....	.....	.....
178	.....	.....	.....
179	.....	.....	.....
180	.....	.....	.....
181	.....	.....	.....
182	.....	.....	.....
183	.....	.....	.....
184	.....	.....	.....
185	.....	.....	.....
186	.....	.....	.....
187	.....	.....	.....
188	.....	.....	.....
189	.....	.....	.....
190	.....	.....	.....
191	.....	.....	.....
192	.....	.....	.....
193	.....	.....	.....
194	.....	.....	.....
195	.....	.....	.....
196	.....	.....	.....
197	.....	.....	.....
198	.....	.....	.....
199	.....	.....	.....
200	.....	.....	.....

Brook, South  
 ndonderry.  
 Cape Breton.  
 fants Co

# GOLD

STATEMENT shewing the average daily labour employed, the amount of Quartz crushed, "the yield of Gold per ton of Quartz," the Quantities of Gold from Alluvial Mines, the yield of Gold, the maximum yield per ton in each District, and in the whole Province, and the value of the average yield of Gold per man employed in mining for the Twelve Months ended December 31st, 1874.

DISTRICT.	Average men employed.	Crushing Mills employed.	Steam Power.	Water Power.	Quartz, &c., crushed.	Yield per ton.	Gold in Alluvial Mines.	Maximum yield per ton.	Average yield per man for Twelve Months at \$18.00 per oz.
Stormont .....	6	1	...	1	236	0 14 5	...	1 11 15	\$503 96
Wine Harbour.....	18	2	1	1	1193	0 10 14	...	5 0 0	633 60
Sherbrooke.....	98	5	2	1	5430	0 14 20	...	4 5 6	741 40
Tangier.....	17	2	...	2	706	0 11 21	...	2 7 1	444 01
Montagu .....	17	2	2	...	496	1 6 10	...	10 12 22	693 53
Waverley.....	40	2	1	1	1682	0 18 11	...	7 0 0	699 13
Oldham.....	11	2	...	2	527	1 5 6	...	18 11 16	1088 83
Renfrew.....	1	1	...	1	10	0 6 7	...	0 6 8	56 95
Uniacke .....	1	1	1	...	19	0 14 19	...	0 16 0	252 90
Caribou.....	...	...	...	...	...	...	...	1 9 23	473 90
Gays River...	...	...	...	...	...	...	...	0 4 10	840 11
Unproclaimed.	...	...	...	...	...	...	...	0 17 12	216 14
Total..								9140 13	664 76



# No. 2.

Statement shewing the number of Men employed, Quartz crushed, and Gold obtained each Month in each District.

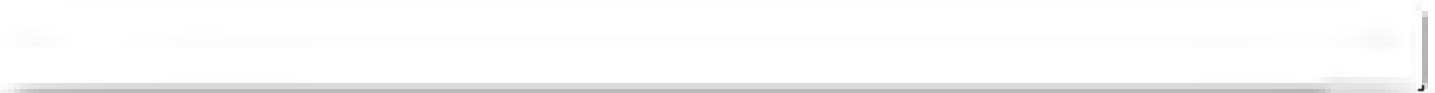
MONTH.	MONTAGU.				WAVERLEY.				OLDHAM.				RENFREW.			
	Men.	Tons.	Oz.	Dwt.	Gr.	Men.	Tons.	Oz.	Dwt.	Gr.	Men.	Tons.	Oz.	Dwt.	Gr.	Men.
January	25	26	70	10	..	50	212	87	19	15	19	45	41	3	15	..
February	21	25	47	11	..	33	174	82	16	..	10	23	60	2	9	..
March	25	20	36	12	..	38	140	56	16	..	6	15	4	14	13	..
April	21	44	82	16	..	29	216	106	17	..	6	21	66	15	11	..
May	24	31	74	..	..	22	115	103	7	..	8	121	60	10	..	..
June	26	23	52	12	..	35	143	188	6	..	10	84	14	4	7	..
July	18	21	52	..	..	39	82	123	9	..	7	25	56	7	7	..
August	5	24	90	2	..	42	121	238	19	..	5	11	44	..	18	..
September	6	57	48	8	19	42	64	72	17	..	10	14	30	7	16	3
October	13	145	39	13	22	49	146	133	..	..	20	113	185	9	11	1
November	12	55	47	0	5	54	100	196	1	..	20	28	50	10	18	..
December	12	25	13	15	..	46	169	163	5	..	15	27	51	2	6	..
	17	496	655	0	22	40	1682	1553	12	15	11	527	665	8	11	1
																3
																7

# No. 3.

number of Men employed, Quartz crushed, and Gold obtained in each Month in each District.

UNLACKE.					CARIBOU.					GAY'S RIVER.					UNPROCLAIMED, &c.				
Tons.	Oz.	Days.	Grs.		Men.	Tons.	Oz.	Days.	Grs.	Men.	Tons.	Oz.	Days.	Grs.	Men.	Tons.	Oz.	Days.	Grs.
1	10	6	17	..	23	54	69	13	12	10	260	19	8	..	7	..	..	..	..
1	9	7	4	..	26	67	80	17	6	9	240	53	8	..	7	..	..	..	..
..	..	..	..	..	29	50	49	9	12	9	260	43	9	..	..	..	..	..	..
..	..	..	..	..	31	59	59	17	7	11	273	50	4	14	..	..	..	..	..
..	..	..	..	..	28	103	108	13	10	10	276	34	3	..	..	..	..	..	..
1	19	14	1	..	14	333	368	10	23	10	2979	466	14	14	13	233	156	2	4





# ABSTRACT ACCOUNT..

RECEIPTS and EXPENDITURE for the Twelve Months, ended 31st December, 1874.

RECEIPTS.		EXPENDITURE.	
Licenses to Search Coal.....	\$4880 00	Return Licenses to search, Coal	\$259 47
" " Work .....	2825 00	Surveys	100 00
Royalty .....	77,354 03		359 47
	<u>85,059 03</u>	Salaries and Surveys, Gold	1908 46
Rents.....Gold .....	1786 00	Royalty Commission	131 53
Royalty .....	3283 71	Return Rents.	82 00
Prospecting Licenses " .....	615 73	" Royalty	67 29
	<u>5,685 44</u>	" Prospecting Licenses	2 00
			2191 28
		General Expenses ....	3795 50
		Postage.....	113 47
		Stationery and Printing.....	2587 15
			<u>6496 12</u>
	<u>\$90,744 47</u>		<u>\$9046 87</u>











**Ann**

**N**

**PRINTED**



# CONTENTS.

---

	Page.
Inspector's Report.....	1
General Summary (Comparative) of the Mineral Produce.....	2
Responsibility of Inspector.....	3
"    "    Owners and Managers .....	4
Coal Trade.....	6
"    "    with the United States .....	9
Gas Coal.....	10
"    "    per centage of Sulphur.....	11
Coal Analyses.....	47
Coal Owners, Combination of.....	14
"    Spontaneous Combustion of.....	24
Directing Acting Pumping Engines.....	19
Electric Signalling in Mines.....	22
Unfenced Pits and Excavations .....	26
Diamond Drill, Satisfactory work of.....	31
Prospecting.....	29
COAL MINING,—Cumberland County.....	30
Pictou.....	34
Cape Breton.....	38
Victoria and Inverness.....	44
Colchester.....	46
GOLD MINING.....	48
Gold Districts.....	50
Iron Mining.....	58
"    Trade Statistics.....	62
Lead Ore Analyses.....	64
Copper Prospecting.....	64
Coke and Coke Analyses.....	65
Fireclay.....	66
Fire Brick and Fire Clay Analyses.....	67
Limestone and Lime Burning in Cape Breton.....	68
Gypsum.....	70
Freestone, &c.....	70
Barytes.....	71
ACCIDENTS.....	72
List of Coal Leases and Lessees.....	79
TABLES.—COAL. Trade by Counties.....	84
General Statement.....	86
Colliery Production.....	87
"    Labor.....	88

## CONTENTS.

Colliery Construction Account.....	89
Exports of Great Britain, United States and Nova Scotia.....	90
Total Production ; 1785 to 1875.....	92
Miscellaneous Notes.....	93
-General Annual Summary.....	94
District Annual Summaries.....	94
1875 General Statement.....	99
1875 District Returns.....	100
ounts.....	104

## ERRATA.

'that' to read—'that that due care.'  
 out 'and,' and read—'used, have been thus generally noticed and dwelt  
 because "it is" believed.  
 vacuum produced.'  
 lock' read 'slack.'  
 end of the first paragraph, the last sentence of the second paragraph  
 "The drill was then taken" &c.,



LETTER  
FROM  
THE COMMISSIONER OF PUBLIC WORKS AND MINES,  
TRANSMITTING  
*A Report of the Department of Mines.*

---

DEPARTMENT OF MINES,

Halifax, February 3rd, 1876.

SIR,

I beg to submit herewith for the information of His Honor the Lieutenant Governor, the Report of the Inspector of Mines for the present year, giving statistical and other information usual in such report.

I have the honor to be,

Sir,

Your most obe'dt Servant,

ROBERT ROBERTSON,

*Commissioner of Public Works & Mines.*

HON. P. C. HILL,

Provincial Secretary.



**REPORT**  
**ON THE**  
**INSPECTION OF MINES**  
**IN**  
**NOVA SCOTIA.**

For the Year ended 31st December, 1875,—By HENRY S. POOLE, F.G.S.

ASSOCIATE OF THE ROYAL SCHOOL OF MINES, &c.

---

HALIFAX, February, 1876.

SIR,—In accordance with the established custom of submitting an annual report on the condition of the mining industries of this Province, I beg to submit the following for the year 1875.

In doing so I have to state that the sanguine expectations of three years ago have not been realized, and that, instead of the active prosperity anticipated for the coal trade, this principal mining industry has suffered a serious decline. Many companies having been compelled during the past year to almost entirely close their collieries, with the consequent result, the distress now prevalent among the mining population of Cape Breton.

The continued depression in mining is clearly observable in the following comparative General Summary, which, I may add, contains information in several of the entries, for which I am indebted to the assistance of gentlemen of the Customs Department.

## COMPARATIVE GENERAL STATEMENT.

Mines 1875.	MINERALS.	QUANTITIES.			VALUES.		
		1873	1874	1875	1873	1874	1875
31	Coal.....tons.	1,051,437	872,720	781,165	2,699,317	1,787,098	1,434,06
41	Gold.....ozs.*	11,852	9,141	11,208	219,270	164,338	201,75
1	Iron ore.....tons	3,485	2,469	4,487	10,455	7,407	13,40
	Plaster....."	120,693	104,140	95,159	120,803	104,140	95,90
	Freestone, &c....."	2,820	8,819	5,778	34,533	40,313	39,63
	Limestone....."		445	4,860		537	3,37
	Moulding Sand....."	130	300	10	260	600	20
	Barytes....."		206	175		2,680	1,75

\*Unmelted Gold valued at \$18 per ounce.

Gold Mining alone, it will be noticed, shows a slight improvement. The first rally that has taken place since 1870 and the second since the decline in the production began in 1867, when the yield was 27,583 ounces. The advance of more than 2000 ounces, which it shows over the yield of the previous year, although small, is satisfactory, for it holds out hopes that with careful management there may yet be a revival of this which once promised to be an important industry. It is also gratifying to know, that the principal miners are of opinion that the current year will show a further increase.

Equally with coal the industries of secondary importance, plaster and freestone, felt the season of depression. In the General Summary the lessened exportations of building stone are not shown, as the increase of the trade in grindstones on the Joggins shore makes up the deficiency. These industries will be again mentioned further on in this report.

Before reverting to the principal one, the coal industry, it may be remarked that neither has the past year been one of much advance and improvement in practice, or in the adoption of new inventions. Since a time for close economy and even for make-shifts as it has been, is not one for experimentalizing or making alterations that entail much expenditure. In former reports, the references made on matters of practice elsewhere of interest, and on the general prospects of the several industries were received as it was hoped they would be, and with no disfavor. I again venture to insert some comments on subjects that appear to me to be of sufficient general interest for insertion; and although a report should be strictly retrospective, make this also to some slight extent prospective.

But first I would refer to a matter, upon a right understanding of which hinges much of the effectiveness of the

Mines Regulation Chapter that due care of life and property be taken, which it is the object of the act to inculcate. I will style it:

**THE INSPECTOR'S RESPONSIBILITY.**—At the inquest held at Montagu in February, referred to in my report of last March, and subsequently shown before the courts to be illegally constituted, the coroner instructed his jury to find the Inspector negligent for not “ordering the necessary precautions to be taken to prevent accidents not only in this mine but others, particularly in mines that have been worked for a number of years.” This incorrect ruling expresses a very general impression existing among many, even of those directly interested in mining, and who should be at least to some extent familiar with the mining law. On this account a few remarks on the matter may not be out of place.

Mining is a business which always will be attended by some danger. Rules and regulations, although they may do much, cannot secure perfect safety. Constant care and watchfulness coupled with good discipline are the only safeguards. The new mining law incorporated in the Fourth series of the Revised Statutes, and enacted in the interest of the lives of working men, recognizes this when it makes the owners, agents, and managers, responsible for the carrying out of the General Rules and Regulations. It not only makes them responsible on direct proof of negligence, but presupposes every contravention to be due to their negligence and so throws the burden of proof of innocence on them.

It states:—“And in the event of any contravention of or non-compliance with any of the said General Rules in the case of any mine, *by any person whomsoever*, the owner, agent and manager, shall each be guilty of an offence against this Chapter, unless he prove that he had taken all reasonable means, by publishing and to the best of his power enforcing the said rules as regulations for the working of the mine, to prevent such contravention or non-compliance.”

The Chapter then gives certain discretionary powers to the inspector, stating that he may do any of the things enumerated in section 20. But the Legislature, recognizing their inability to secure the services of a mortal who was Argus-eyed and who could be ubiquitous, did not require him to guarantee from time to time the safe condition of any mine. They wisely placed the responsibility of

## MINES REPORT.

---

managing the mines solely and altogether on the own agent and manager. The law further defines the "manager" to be the chief officer, having the *daily supervision* of underground workings; and no-where states or even implies that an inspectorial visit guarantees the perfect satisfactory condition of any mine, or that an official visit can be pleaded as an excuse in the event of an accident resulting from non-compliance with the law; recognizing that an occasional visitor can only judge of the general practice, and that the work of detail must necessarily be left to those in daily charge. And that they may be reminded of their duty respecting the law, it is required that an abstract of it be kept constantly posted in a conspicuous place, where it may also be seen by workmen, in order that any of them may, should they think that the ordinances enacted for their safety are neglected, complain to the Inspector, whose duty it would then be to investigate the complaint.

While the General Rules go as far as it is at present thought advisable to legislate on the general practice, the law also sanctions the making of special rules which are to have the same force as the general rules at any mine where it is found desirable to have them; still, much must be left to the individual discretion of managers who have the time and opportunity to study the specific requirements of each mine. The giving of minute instructions, that are to be implicitly obeyed, is seldom to be commended, since they may so hamper a manager as to destroy that individuality of character upon which a reputation for good or bad management must depend; and by removing much of the responsibility to take away much of the incentive to close attention.

A confirmation of this view of the manager's responsibility is furnished by the enactment of the section in the mining law of Great Britain, which requires all managers of non-metalliferous mines to now hold certificates of competency. An excellent law. For through it in time a body of men will be secured, better trained as a class than heretofore, to manage extended workings, and to have that essential necessary care for the lives of the hundreds of men now placed under their individual control.

Official interference beyond that which is defined by the strict letter of the law, it is at present thought should be exercised with caution. And although there is the clause which permits (on arbitration) an Inspector, in particular cases, to use his own judgment, it yet says he "may,"

does not say he "shall" interfere. When what seems a particular case does arise, great care should be taken to see that the exigencies of the case really require further interference, and that no prejudicial favor for any plan or system or modern improvement dictates the step. For instance, a recommendation which would necessitate a careful supervision over many details, which supervision could not be given by an inspector in this Province where the operations are so widely scattered, and at some seasons so difficult of access. Such a recommendation should be made with caution, lest the inspector become a sharer in the responsibility. Then in matters of such moment as to greatly effect the expense of working and the question of successful competition between rival mines, hesitation is undoubtedly expedient. Hitherto I have thought myself justified in not acting under this clause so long as I have been in doubt, and no clear way for remedy presented itself. I have in one or two cases ventured to suggest alterations, but there are questions of practice, of grave moment, of which I have doubts and of which the law has in part treated, but only so far as our present experience seems to warrant. Among these which I believe have to be yet grappled with are the questions: the compulsory use of safety lamps, and the use of powder in fiery mines. Where gas is given off from a coal, it cannot be denied there always will be a possibility of ignition by the use of powder; and in such mines where there is an occasional liability to cut feeders of gas, there must be a constant fear of serious results, fire and explosions, with loss of life and property. In such cases it cannot be questioned that it would be safer not to use powder at all, but who is to decide between safety and expediency? who is to say whose mine shall be worked and whose mine shall not be worked? for in these days of close competition the question would resolve itself into this.

Again, in every pit where gas is ever found, it would doubtless be safer always to use safety lamps, if only the same precautions would be taken with them as with naked lights. But unfortunately it is not so. Good authorities are of opinion it is better to have it felt that the use of naked lights requires good ventilation and good management, than that the use of lamps should give a false sense of security, and induce carelessness. Even in England where mining law has been for a long time studied, these questions have been no more definitely determined, and the law does not say which class of mine shall, and which may not invariably use safety lamps. The circumstances of

## MINES REPORT.

necessitate the use of lamps but a legal  
be difficult and oftentimes invidious  
my duty I have endeavored to bear in  
subject of the enactment of the law was  
and not so much to punish bad mining  
ing in the future. I therefore venture  
at the spirit of the law, when I point  
t and give time for the necessary com  
aling to the magistrates for the inflict  
is, however, a time when forbearance  
out until I find an endeavor is made to  
s clemency, and one warning remain  
tinue to ask for your sanction to this  
o be borne in mind that many of those  
ave not had much or any experience  
hich they have been brought up, and  
sequently they have not the training  
tion gives to fit them to prepare for al  
ow with the extension of their work  
nces must be made for them. Nor is  
en from that false sense of security  
a accident engenders, or to arouse an  
g out of the law in those who cannot  
the need in their individual cases for

—The reduction of ten per cent. in the trade of Cape Breton to have of the previous year, would not of itself occasion the present distress among the people of that county, had it not been that the previous season followed a year of unusually high prices, which had induced additional men to settle in the county, and had given color to the impression that they could with profit, compete in the trade with the Americans. Then the winter of '74-'75 drew off the personal credit of the miners, that they could not pay it during the past season, one which they do not believe would prove as dull as the present. It is more so, and consequently the local merchants are unable to gain to make advances, and furnish the necessities of the winter.

he year were 706,795 tons, a decline  
ose of the previous year; and less b  
e of the year before that, when th  
erous than it has ever been. The d



cline was chiefly in the trade with the United States and West Indies, which fell off 48,000 and 31,000 tons, from a business of 138,000 and 47,000 tons, respectively. A small decline of 2,000 tons took place in the Home Consumption. These losses in trade were in part balanced by the increased shipments, of 27,000 tons to Quebec, 7,000 tons to New Brunswick, 7,000 to Newfoundland and 2,000 tons to Prince Edward Island. The county of Cape Breton sold 32,000 tons, and Pictou 21,000 tons less than the year before, while the sales from Cumberland were 11,000 tons in excess of those of 1874. These figures are given in round numbers.

The cause of the decline in the trade with the United States will be especially mentioned further on, and some reasons suggested why it has been produced. While the retained duty of 75 cents in gold is an undoubtedly good reason for the reduction of that branch, a similar excuse cannot be pleaded for the loss of the West Indian trade. A reference was made to this matter in the last report, and the competition due to the low freight's current from England and Baltimore shown. To encourage this branch, which should be one of the most important of the export trade, is a matter for the consideration of our own merchants. And while they have to deliberate how manufactures at home may be developed so as to occasion full return cargoes and so reduce the rates of outward freight, the coal producer should not forget that in the preparation of his raw product for the markets abroad he has still left him much room for improvement. That coal be shipped large and dry is essential to the good condition of a cargo on arrival after a long voyage. The dropping it down 20 or 30 feet into vessels, shipping it in all weathers, and frequent shovellings are not conducive to the good quality of ordinary coal. The deterioration of small and wet coal from heating in the confinement of a heap or in a semi-closed vessel is very much greater than is generally imagined by miners and shippers. Gas manufacturers, however, know it to their cost, and under the heading "The Spontaneous Combustion of Coal" brief reference is made the subject.

Of the coal seaborne 201,857 tons were taken by 480 steamships, but as this number includes the steamers that called at the coal ports for bunker coal the average size of the cargoes does not appear. 420,741 tons were carried by 2,832 sailing vessels, which on an average took but 148 tons; a small average, and one that shows that the class of vessels engaged in the trade was smaller than usual.

It will be noticed that no material difference took place in the Home Consumption of coal during the last three years, and instead of that increase naturally to be expected, there has been an actual, though small, decline. The difference has been somewhat more than made up by the importations of Anthracite. The Maritime Provinces imported 20,520 tons of Anthracite in 1874-5 from the United States, for use in furnaces and hall stoves.

The decline in the home consumption of native coal is much to be regretted, for no branch of the trade is so important as this, for by it the growth of native manufactures may be gauged. An increase is to be anticipated for the present year, as the Steel Company of Canada will require large quantities of coal in the form of coke on the blowing in of their blast furnaces, which is expected to take place in the course of the summer. If the expectations of that company are realized and their works are established on the scale contemplated they will alone consume some 100,000 tons of coal a year. The impetus which such an industry would give to the country is one which it is desirable to speak of as effected rather than as contemplated.

There is one feature of the general trade which as it shows a healthy condition is well worthy of more than passing attention, it is the trade with the neighboring Provinces. Even in competition with free American coal it has more than doubled within the last four years.

Coal sold to neighboring Provinces :

1871 .....	168,577 tons.
1872 .....	285,433 "
1873.....	337,993 "
1874.....	338,754 "
1875.....	381,711 "

NOVA SCOTIA SOLD			CANADA IMPORTED FROM	
At Home.		To other B. N. A. Provinces.	United States.	Great Britain.
1871	150,282	168,577	216,633	190,680
" 2	199,886	285,433	.....	177,904
" 3	215,295	337,983	428,455	131,338
" 4	214,965	338,754	671,224	186,753
1875	212,630	381,711	512,885	.....

A comparison of the statement of the numbers of persons employed at the collieries during the last two years, clearly

shows how hard the times have been for the workmen engaged at the business of coal mining. On an average coal was drawn from the pits only on 136 days out of the 300 working days in the year, or on less than half. The total number of persons employed was less by 505 than during the previous year; and the total number of days labor performed was less by 175,839, which represents a reduction of almost \$200,000 in the money expended for labor alone. The men who did get work, were employed on an average only four days in the week; that is, when an average is taken of the whole country. But as the decrease in business fell most heavily on Cape Breton, the workmen there consequently suffered more than in either Cumberland or Pictou Counties.

- The Coal Trade with the United States has been even smaller than was anticipated a year ago, when it was stated that probably not more than 80,000 tons would be sold for gas making in that country in 1875. The quantity actually exported for that purpose was under 50,000 tons, as is shown in one of the appended tables, which, so far as can be ascertained, contains all the details of that branch of the trade.

Last year an account was given of this trade and its prospects, for which much indebtedness was due to the well known coal agents Messrs. Perkins and Job, of Boston and New York. Mr. Perkins of that firm has this year had the kindness to give further information and particulars, regarding the trade of the past year, which enabled me to write with more confidence on the subject.

NOVA SCOTIA EXPORTED TO THE UNITED STATES.				CANADA imported from the United States.
Years.	Quantities.	Duty.	Authority.	
1865	465,194	Free.	United States.	
" 6	404,252	\$1.25	Custom House.	
" 7	338,492	"	Reports.	
" 8	228,132	"	"	
" 9	257,485	"	"	
1870	168,180	"	"	216,633
" 1	165,431	"	"	
" 2	154,094	.75	"	428,455
" 3	264,760	"	Nova Scotia Dept. of	
" 4	138,335	"	Mines Reports.	671,124
1875	89,746	"	"	512,835



3 For the increased facilities which new railway connections enable regular deliveries of fresh mined coal to be made during the entire year.

Although the trade has declined to the extent shown above, there is yet no immediate fear of losing entirely this branch, for gas producers are still of opinion advantages are derived from an admixture of our coals with those of the United States. Of the quantity 850,000 tons annually consumed in New York and New England, perhaps one-tenth would be of Provincial coal were competition permitted.

Before proceeding to treat of the trade of the past year, I desire to call attention to the statement that our coals contain much sulphur. That they contain more than the best American gas coals, cannot, I fear, be questioned, but for the high per centage imputed to them by Professor Chandler I can find no other authority. Addressing the Gas Light Association at New York, October 20th, 1875, he stated that "Nova Scotia gas coals (Glace Bay, Lingan, International, &c.,) contain from three to five per cent. of sulphur." Such a statement made by such an authority as Professor Chandler, is apt to depreciate the value of the coals mentioned. That it was made with the intention of injuring our coals is not probable. More likely it was a hap-hazard conjecture intended merely to show that, in his opinion, they were of such a nature as not to be worth treating with accuracy. I have appended a table of analyses, in which will be found no such per centage as 5 or 4, or as high an average as 2.3 per cent. One analysis certainly does show a higher per centage, but the sample (?) of the Block House coal, of which it was made, was "taken without selection from the coal as it came to bank, and may be assumed only in a general way to represent the average quality," so Mr. Robb states in a foot note to his report, from which it is taken; in other words it was a hand specimen, and therefore not an average sample of the seam. As the Block-house is known to be one of our best gas coals, the per centage stated is evidently not an average one.

The supplies of gas coal in the States in the spring of last year were very large, owing, it is stated, to the excessive importations of the previous year, and the falling off in the consumption of gas, which was due to the general depression in business during the winter of 1874-5.

It was fully expected that the prices of all coals would rule lower for 1875 than for the previous years, but the great decline that eventually took place was not anticipated. The

## MINES REPORT.

paid at New York in 1874, which was a reduction of its for that of 1873, was \$7.50. Then the sharp competition between the different American coal companies led in a still further reduction, and in the making of contracts for 1875, for their best gas coals at \$6.50, a price was maintained throughout the year. This rate it was apparent would have an adverse effect on the trade of foreign coal, and although our actual shipments have been small, they are quite as large as was expected in the face of such competition.

Perkins estimates that the cost of getting the American coals to market at the price named, \$6.50, would leave the companies only about \$1.25, Am. Cy. per ton of 2240 lbs. for the coal screened on the cars at the collieries; a price would certainly not be considered remunerative at any of the collieries.

Some small orders were taken for Cape Breton coal early in the season on the basis of \$1.75 gold f. o. b., and the cost to the purchasers of these shipments may be estimated as follows:

Cost at Shipping Port.....	\$1.75.
Wharfage .....	.75.
Local Premium, Insurance, &c., .....	.50.
Maximum Freight paid during the year.....	2.00.
Cost in Am. Cy. delivered at New York .....	\$5.00.

is less by some 68 cents than the average cost at New York in 1874. Had the demand been as large as in former years it could not possibly have been secured at the low rate named above. Some 12,000 tons were delivered at New York early in the season. Later in the season some further sales were made at \$4.50 Am. Cy., delivered, and about 12,000 tons more were shipped at that price, which would make the average cost for the year, \$4.75, or 93 cents Am. Cy., less than the price of American coal for 1875.

The result of these later sales to the coal companies may be as is stated.

Price at New York in Am. Cy. ....	\$4.50.
Freight in Am. Cy. ....	\$1.75.
" Duty, Insurance, &c. ....	1.00.      2.75.
Am. Cy. ....	\$1.75.

The value f. o. b., at the Shipping Port in Cape Breton, or 50 cents more per ton than the American coal companies realized for their coal at their collieries.

At the end of last year the gas companies of New York and New England held large stocks of coal, and sufficient to supply most of them until July, and some of them for a still larger period. They have been induced to lay in large stocks on account of the low price of the standard American gas coals, under the expectation that the decline was temporary and that higher prices might be demanded in 1876; a fear that we now know there is no prospect of being realized. Then the falling off in the consumption of gas in many localities, incident to the continued depression at the factories, and a general desire to economize in all departments where gas is required, and the ability of gas companies to obtain a larger yield of gas per ton of coal than formerly, which has arisen from the use of better coals and naphtha, and of improved machinery connected with the distillation of gas from the coals now in use.

Remembering the increased competition among the miners of American gas coals, the increased facilities they now have for putting their products into the markets on the Atlantic coast, and the prohibitory duty of seventy-five cents in gold, an increase of any moment in this branch of our export trade is not possible for the present year. When the United States imposed the duty on bituminous coal, the imports from Nova Scotia were more than double the exports to Canada, (see table page 9); now the exports have quadrupled and the imports decreased in an equal proportion. The knowledge of this change in the relative condition of the trade of the two countries should strengthen the hands of the free traders in the New England States, who desire the duty to be taken off; that as Ohio profits by the free admission into Ontario of her coal, they may benefit by an open competition between the producers of native and Provincial coals.

The latest advices from New York report that contracts for American gas coals have been made for the present year at \$6 per ton of 2240 lbs, delivered at New York, and that contracts for 150,000 tons will likely be made at that price. This is 50 cents cheaper than the rate of 1875, cheaper by \$1.50 than 1874, and \$2.25 less than 1873. The likelihood of our sales to the United States during the current year exceeding those of 1875 is most improbable; and were it not that Cape Breton coals make a strong and good coke, and are liked on that account to mix with American gas coals;

## MINES REPORT.

---

l their way to New York with an ad-  
ts in gold. There is now a prospect  
taken off during the ensuing Session  
if it be removed it is feared it will be,  
materially effect the trade with the New  
g the ensuing season.

**COAL OWNERS.**—In September last the  
st of the coal companies operating in  
Stellarton, and unanimously were of  
iation would be for their general wel-  
d that it was impossible to continue  
e then state of the trade. They mu-  
t their collieries were kept open at a loss;  
able for the coal were ruinously low; in  
knowledge, to the competition among  
ide of a limited market, but chiefly to  
de the Dominion.

was proposed to partially control the  
regulating the output, the prices and  
ad further to use any political influence  
it acquire for the interest of their trade.

I have only to remark that colliery  
s appear to forget that they acquired  
Crown at a fixed and uniform royalty,  
t to pay out from their capital account  
the purchase, the interest of which is  
yalty. The former part of their pro-  
commend it, and the arguments ad-  
, worthy of general consideration.  
ways a danger that such a combination  
l managed is liable to lead to abuses,  
of workmen which have been under the  
Legislature and regulated by enact-  
nd injurious by raising the price of  
ch legitimate trade competition, with  
tricts, can afford; so such an association  
poly may press hardly on the public for  
few. But as there are so many in-  
association that would take the form of  
ll be agreed to or carried out in the

ent can doubt but that the present  
is most unsatisfactory. The exports  
665,811 tons in 1873, to 533,162 tons  
,165 tons in 1875. While the home



consumption has remained about the same 215,295 tons, and 214,965 tons, and 212,630 tons in the three respective years. The trade with the United States fell off from 465,194 tons in 1865, to 154,092 tons in 1872; reviving a little in the busy times of 1873 it amounted to 264,760 tons, declining in 1874 to 138,335 tons, and further in 1875 to the almost nominal quantity 89,746 tons. The adverse duty of 75 cents in gold practically prohibiting the importation of any quantity of Provincial coal into that country; and the royalty of 1 cent's in this, makes the sum of 85 cents in favor of the native producer of bituminous coal competing in the New England States. Were the duty removed, one-half the sum would enable our mines to ship at a profit and save the other half to the consumer. In connection with this subject our miners complain that every facility is given to the importation of American coals and that the quantities of both anthracite and bituminous are annually increasing. The quantities are shown elsewhere in the extracts from the Custom House reports.

Among the expected advantages to be gained by a combination would be the employment of one sales agent in each market, instead of the many that are now engaged in selling the several coals, and in underbidding one another for the orders that may exist. The minimum price being fixed by the combination for each quality of coal he could sell to each customer, that quality more especially adapted to the particular requirements of each. At present there is always an endeavor on the part of each agent to force the market and sell even a coal not specially adapted, and as an inducement for a trial to be made at a low and unprofitable figure, with a result unsatisfactory to both buyer and seller. Besides the present competitive stand taken by the several operators gives a prejudicial advantage to purchasers of large quantities, who, by pitting one seller against another, are ultimately enabled to buy what they require at rates so low as not to pay even the current expenses.

One general sub-agent could make all the foreign contracts, arrange to deliver a definite quantity at stated time and as required, say 1000 tons a week, and be able to carry out his contract which no one colliery employing sailing vessels now can pretend to do. The association could also appoint one person to charter vessels and regulate the supply of tonnage for each shipping pier, doing the work much cheaper and better than it is now done. And in this

times when tonnage is scarce, there would be no port competition for the shipping at any place beyond the demand that the general trade may cause, while under the present system, competition often leads to the payment of exorbitant rates.

It has been often the case that a whole fleet of sailing vessels have been chartered at one time for one company. They sail and arrive together. Some are detained for weeks waiting for their turn and incur demurrage. Then, at times many after loading are detained by contrary winds, and collecting, sail and arrive together at the port of discharge consequently occasioning unnecessary expense for additional or temporary storage.

By the employment of steam-coiliers, the supply can be regulated and contracts entered into with a certainty of knowing the results beforehand, while by the use of sailing vessels with their fluctuating rates of freight, no certainty can be relied on when making contracts.

Then again somewhat of the same reasoning would apply to the carriage of coal by railway, for one agent would have more weight in arranging the tariff, in regulating the daily supply to the road, and by commanding the handling of fifty or one thousand tons of freight, could obtain the most favorable terms for all customers and producers; while several agents, influenced by conflicting interests can be made to clash and wrangle over the supply of trucks and wagons provided by a railway.

A combination could also deal with the question of labor and arrange the rate of wages and the allowances and off-takes, the house rent, the coal supply, &c., which now, not being uniform, cause discontent among those, doing similar work at the different establishments, whose allowances are not always equal. Nor would such a combination settling these matters be adverse to the interests of the workmen, who would get steadier employment and be better satisfied with their work if the business they were engaged in were profitable. The uniformity of allowances and rates would also tend to reduce the migratory habit of trying first one colliery and then another.

It is hardly expected, even by the most sanguine advocates of the scheme, that all the advantages enumerated as possible to result from an effective association are ever likely to be brought about, but the arguments that are used and have been, thus generally noticed and dwelt on because

believed much good would result from a united understanding such as a real combination would produce, and because the Province at large benefits by all that transpires for the real welfare of the mining industry.

Looking back at the history of previous mining operations, we see the want of much accord in the unnecessary expenditure of capital. The waste being dictated by a jealous spirit that hoped, yet without any ground for belief, to try by exclusion to prevent competition. We see it in the two railways, seven miles long, running side by side to the Middle River of Pictou, in the two branches from Westville to the main line at Stellarton three and a half miles long, in the two railways running together for ten miles from the outmines to Sydney Harbor, in the two artificial harbors at Glace Bay, and in the two breakwaters at Cow Bay. An unnecessary expenditure of at least a million and a quarter of dollars. The limits of the markets now open to our producers are well known, and it is also well known that the sales cannot be increased even by great reduction in the prices beyond the point at which mining can be done without loss, and yet the competitors for the trade that does exist underbid one another in the hopes that their aggregate sales may be sufficiently large to pay the current expenses even if there be no margin left to cover the wear and tear. In Pictou county this state of things is especially felt, and it is confidently expected that there some steps will be taken to remedy it. but it is doubted whether a thorough combination could be made among the miners of the three fields, Cumberland, Pictou, and Cape Breton, for so much undeveloped property is yet held in the former and latter. Then the formation of an association would give "Promoters" the excuse for foisting properties on the public as of great value since they were not in the hands of a ring of monopolists. But in Pictou county where the field is limited, and the greater part of the available area held by five companies, the output could be the more easily controlled and apportioned off to each, according to a scale to be mutually agreed on. The minimum price and the maximum quantity being fixed under penalty to the association.

A thorough combination could also effect other advantages to Pictou County. There could ultimately be a reduction in the number of shipping piers, and in the staff employed: in the use of one line of railway where now two run side by side. Then a few hundred yards of track would put all in communication with the main line, and the cheapest ship-

ping point for each season could be selected and used by all. Further were a port open all the year round in use at Halifax, or a more easterly and nearer port as Whitehaven or Liscomb for the Pictou district, and Louisburg for Cape Breton, the regularity of delivery could be further ensured and additional traffic gained for the railway.

While it is unquestionable when combinations of capital and labor acquire much strength, and as monopolists are able to dictate terms and prices, that injury to the community results. It is also well known that the various guilds and trades have found it necessary for their self-protection to form boards or combinations and arrange prices of commodities. Competing freight and passenger transportation companies agree on a scale of prices, and the whole business is made profitable; though occasional misunderstanding may dictate a cut-throat policy in the hope that by some self-sacrifice a competitor may be ruined. At many centres of commerce boards of trade exist and fix the prices of the articles they manufacture or sell in each market. And the same may be said of workmen. On every side the coal master sees associations for mutual protection and trade unions raised for self-defence, and he naturally concludes that a similar association will also be for his advantage.

If for no other reason than the following I am persuaded that an association would be for the service of the industry. No marked improvement took place in England and abroad in the theory and practice of mining, until societies and institutes were formed, where those interested in the business could meet and discuss subjects of mutual utility; where modifications in ventilation, in the different systems of winning, in the machinery employed, and the various interests of the industry could be shown, criticized and condemned or praised as they seemed to deserve.

More than the rudiments of such an association now exist in Pictou County, but not in Cape Breton, where it is more generally thought there is less call for good discipline and high class mining than in Pictou. In time it is hoped that apathy will be removed, and a greater pride taken in displaying thorough and substantial workmanship, attended by economic results.

At the meetings of such an association, papers of practical value, such as I consider the following brief sketches of a line, could be read; and such interest excited as to induce

the managers to make experimental trials and collect the necessary data that would show the absolute value of such interest.

**DIRECT ACTING PUMPING ENGINES.**—The use of these pumping engines in mines, has of late years, rapidly increased, since they commend themselves on account of their low first cost and the greater convenience they afford for extracting water from dip workings. In previous reports reference has been made to their introduction into this Province and to the conditions under which they have been successfully applied. Not only are they in use as subsidiary aids to the main pump, but in some cases as the only appliance for freeing the entire workings from water. The advisability of this proceeding is, in some cases, questionable as in the event of a sudden influx of water taking place where the standage is small, there would be a likelihood of the pumps being lost. But otherwise the only objections to them, are, the heat given off from the steam pipe, and the escape of the exhaust steam in the workings; both of which objections may be in part, or entirely, removed by coating the pipe with a non-conducting material and by turning the exhaust steam from the engine into the suction pipe of the pump.

There is also the objection, common to mostly all appliances, that they do not stand well continually pressed to their full capacity. In some cases much trouble has been met with, and several alterations have been tried before the pump would work satisfactorily with the exhaust steam turned into the suction. The experience acquired is worthy of note.

Where the quantity of water pumped is small and the column heavy, it has been found inexpedient to turn the exhaust into the suction close to the engine, but advisable to enter it into an enlarged section of the suction pipe cooled by the sump water for the exhausting is then more uniform and the water less heated. Where the water is much heated by the exhaust steam, the column of discharge pipes suffers from expansion, and the subsequent contraction on cooling when the pump stops; then joints leak, and the flanges are apt to be broken off by the strain. The introduction of the arrangement is not new, and the advantages of the system, and the reputed real saving of power are still sometimes questioned. Special modifications and arrangement of valves have elsewhere been patented, but here simple connections have alone been tried. When it has

## MINES REPORT.

---

ed, it has been reported serviceable, and to possess the following advantages: First, that the exhaust steam is got rid of at a low cost, but with an actual saving in proportion to the amount of vacuum production in the pipe; Second, that the power of the pump is increased for a given steam pressure; and, Third, that the steam from the cylinders coats the suction and delivery pipes and helps to resist the corroding influences of acid water. Mr. Rumble, the engineer for the Cape Breton Colliery, reports that they have four pumps thus fitted, two at the Reserve, and two at the Emery collieries. The saving, he states is, with a distance of 1400 feet between the boilers and the pumps, 10 lbs. of steam pressure, an increase of speed from 30 strokes, when exhausting into the atmosphere to 37 strokes, when exhausting into the suction. He adds, the pumps work freer from thump and vibration when exhausting into the atmosphere.

For further reference was made on page 11, of the report for 1900, to a similar arrangement at the Nova Scotia colliery, where a special pump forces water to a height of 560 feet. When on an open exhaust the pump made 26 strokes per minute, and when exhausting into suction, the same pressure increased the number of strokes to 32 per minute. A similar pump in the cage pit at the Albion Mines has been similarly altered, and it is reported to work with 4 lbs. of steam than before.

At the expense of a heavy sinking set of pumps for the liner pit, the shaft was put down by the aid of two of the company's special steam pumps, and although the feeder was large, no accident occurred. A pump of this kind was previously noticed as in use at the sinking of the shaft at Glace Bay. The efficiency of this pump in the hands for shaft work was further proved by lowering the water in the Drummond workings filled to extinguish the fire.

The modifications of pumping engines are constantly being introduced abroad, and many decided improvements have been made. Among them the adaptation of hydraulic engines for pumping from the deeps, the power being derived from the main column of pumps, or by tapping the shaft of the shaft. The draining of workings to the deeps by means of rods connecting the pump with the main set, when the dip is slight, is not easy, and it is more expensive. Nor is it always wise or even possible to use a steam pump, while an hydraulic pumping engine may

## MINES REPORT.

---

be flooded and still go on working. Such an engine placed at the bottom of the slope, a supply pipe is carried to it from the main column, or from the tubbing, and a delivery pipe from the pump is led to the main sump, whichever way the supply of water to the engine is obtained, an equal amount of work is added to the main pumping engine. It has also been suggested that all the water in underground work, for which engine power is employed, might be effected by hydraulic engines, thereby dispensed with all boilers and steam pipes in the pits; the power of the pumping engine necessarily being proportionately increased to the extra amount of work done by these engines. As an instance of one of the advantages these engines possess, a dip in which one of them was placed in a Clay Cross colliery was accidentally flooded, and the engine was under repair two months, during the whole of which time it continued work.

For the main set in place of the heavy and costly Cornish or Bull engines, compound engines have in many cases been substituted. These although theoretically of greater value and more complex than the single expansion engine have been practically proved, as marine engines, to be lighter, cheaper, and more economical. Ocean steamships instead of burning 5 to 6 pounds of coal per hour for one horse power with single cylinder engines, are now run with 2½ to 3 lbs. when driven by compound engines. Compound engines, although twice as complicated as those with single cylinders have not been found any more liable than engines of simpler construction to break down under the strains to which they are subject by the violent pitching and heavy rolling of a ship at sea.

At the collieries it is no uncommon thing for engines to consume as much as 16 lbs. per horse power per hour, until late years, in England, when such coal as the collieries use for steam purposes became saleable, there was an inducement for the proprietors to look into the subject they are now doing.

In Cornwall it was different, and for a long time attention has been there paid to the economy of fuel. Ten years ago engines were devised and worked with an expansion and even ten-fold expansion. The latter giving the economical duty of 112 millions, while the average duty was 48 millions. But of late years the records show a falling average duty of 48 millions, partly due, it is thought, to the absence of competition, and partly because it was

\_\_\_\_\_

use of electricity to convey signals under-

1 of the system are that signals may be

of the system over the ordinary lever and

**f the two systems on a plane of 500 yards**

no. 3 inch diameter of 7 galvanized wires at

011000



## MINES REPORT.

quired for an engine plane 500 yards long to signal any or all parts of the plane to the engine house only :

1 Non-rapper bell.....	£4.10
12 Cell battery .....	3.18
3 Rapper bells and buttons to be fixed at points where signals are most frequently sent from .....	.18
66 Side or roof brackets and shackles complete ....	£4. 2
230 lbs galvanized iron telegraph wire, bare.....	3. 2
20 yards thick guttaparcha covered copper wire, taped.....	. 8
5 lbs Binding wire. ....	. 2
Instructions for fixing and plan of connections.....	8. 8
	£20. 4

Neither of these estimates includes the cost of fi which would be about the same in both. Mr. Rad further writes, in reference to his system, that the cost v considerably, according to the nature of the signallin quirements, and that the various articles are specially for colliery purposes. Some pits signal merely from part of the plane to the engine house; the simplest most general plan. Others signal from the engine l to the bottom of the plane, and also from the bottom o plane to the engine house. In some instances interne bells are fixed at different points, but in all cases signal be transmitted from all parts of the plane to the ei house. Rapper bells for both sending and receiving si are £5 each.

Mr. J. P. Jackson speaking of the system at a meeti the Chesterfield and Derbyshire Institute of Engineers "We have it at our collieries at Clay Cross, and I con it has paid for itself over and over again in the econon labor and time in signalling. Where a man would ha pull a heavy lever ten times to signal, the electric sy does it in an instant. Then, again, there is no breakag if there should be, any man who understands it can join wire again in a minute or two; with the old or lever sy it took a considerable time. In cases of falls of bind most valuable; and, in fact, I can recommend it to any who has a long engine plane, or even the case of very mines in shafts."

Messrs. Siemens Brothers have also given their attet to this subject, and they have constructed a magneto-ind in combination with an alarum. This they contend is p rable to batteries, as its power remains constant and is affected by damp. The signals are sent by turning a ha at the signal station, and cannot be transmitted by mo

## MINES REPORT.

---

ing the wires in contact at any point on a plane, which is the advantages that batteries possess. The expense of installing, both up and down a shaft, is estimated at one pound sterling. Where it is only desired to work in one direction the expense is about halved, as the battery may be separated from the alarm bells.

**SPONTANEOUS COMBUSTION OF COAL.**—This subject is now being investigated before a Royal Commission, sitting at London, and the results of the enquiry it is expected, will be published during the year. As the report will be well worth a careful study by our coal miners and coal dealers, attention may, with advantage, be directed to the subject. When the report is published, they may seek for suggestions wherein the suggestions it contains may possibly be applicable to their individual cases and requirements. It would be worse than useless to try to ignore the fact that on several occasions some of our Cape Breton coals have taken fire from spontaneous combustion, as other bituminous coals of Great Britain and the United States have done, and consequently we must be prepared to acknowledge that the danger will always exist unless proper precautions are taken in the future. It cannot be denied that coals have hitherto been shipped in an inferior condition, and there is room for improvement in the methods of handling them. The coal is too much exposed to the weather, it is broken up too much to withstand long, and even short voyages, without suffering serious deterioration. The excuse which is sometimes made, that it is not worth the pay to take any more care, is made in thoughtlessness and indifference to the true interests of the trade. It is a question that two cents worth of more care previously taken during shipment, is worth at least twenty-five cents a ton at the port of discharge.

The liability to spontaneous combustion is, as has been shown, not singular to the coals of Cape Breton. Statistics show that most if not all the kinds of bituminous coals shipped from the United Kingdom, are liable to take fire when in heaps or in confinement. The statement has been made by the Underwriters' Association, of Liverpool, that of the vessels carrying upwards of 500 tons of coal to ports south of the Equator, 2 per cent. were lost from this cause in 1873, and as high as 4 per cent. in 1874. Some information in connection with this matter has been collected on the west side of the Atlantic, and it has shown that probably a large number of American bituminous coals are subject to spontaneous combustion.

taneous combustion. Even the best gas coals, Penn and Westmoreland, containing only a small per centage of sulphur, have taken fire in the coal sheds of the gas companies using them.

The theory hitherto generally entertained, attributed spontaneous combustion solely to the presence of pyrites in the coal. There is every reason to believe that it often largely assists, but that it is necessarily the cause, is shown to be a matter of doubt by the spontaneous combustion on four separate occasions at Boston, of some Albertite, which contains no sulphur. The increased per centage of casualties in 1874, over the preceding year, is attributed in Great Britain to the extra demand in that year causing the quality of the coals exported to be overlooked; less care being taken than in former years to reject the "brasses," shaly portions and fine coal. It is now strongly surmised, as the result of experiments tend to show, that coal, like fine charcoal, when damp and in a heap, absorbs oxygen on exposure to the atmosphere, and forming carbonic acid developes heat. The carbonaceous matter of the coal as well as pyrites oxidizing on exposure. It has also been found that the coals most liable to spontaneous combustion are not those which contain the most sulphur. It is generally expected that the report of the Commission will be adverse to the ordinary system of partially ventilating the holds of vessels, and possibly be in favor of hermetically sealing the hatches. It is fully anticipated that a recommendation will be made that coal for long voyages be put on board dry, and as large as possible, that the area of coal surface, exposed to the action of the air and moisture, may be kept as small as possible.

Closely connected with this matter is the deterioration to which, as is well known, all coals are liable on exposure. To what extent they are is seldom considered. Dr. Warrentrass has made public the results of some of his experiments. He found that a sample of bituminous coal for some time exposed to the weather lost more than one-third of its weight, and that its value was still more reduced. The yield of gas was diminished 45 per cent., and the heating power 47 per cent; while a sample of the same coal protected from the weather lost only 25 per cent. of its gas producing power, and 10 per cent. of its heating power. The loss in both cases being due to the oxidation of the volatile constituents of the coal; and their reduction in their amount wa



No action, so far as is known, was ever taken under the authority of the above clause until in the past year, when a suit was brought at Guysborough against the Eldorado Company, of Wine Harbor, for leaving pits open and unfenced. Claim 2,200 dollars. But as no legal agent of the company could be found the case was dismissed.

In the early days of gold mining, some attention was paid to the clause, and in some districts abandoned pits were fenced. But as many mines were unsuccessful, further expenditure, merely to make unprofitable excavations secure, was generally avoided. No one being sufficiently interested in the matter to bring an action; the law came to be looked upon as only available in the event of damage accruing from neglect. What was anybody's business was nobody's business, and so general had the neglect become, when the Mines Regulation Chapter came in force, that it was an exception to find the letter of the law complied with. This act requires in *General Rule 13*, that :

" The top of every shaft, which, for the time being, is out of use, or used only as an air shaft, shall be securely fenced  
\* \* \* so far as is reasonably practicable in every mine."

Now many areas are held by persons absent from the Province. Some are worked by tributers not legally responsible. Others have excavations made years ago, and left unprotected before they came into the hands of the present holders, as for example, the shafts sunk by the prospectors in the small lots, 20 by 50 feet, first leased in some districts. Then there is the excuse, that the pits have been fenced but that the fences have been taken away for fire wood by the very people for whose protection they were erected. For these reasons it was then felt that the progress of enforcing the law through the authority given to the inspector would be slow, yet there are now more unprotected pits than it was anticipated there would be at the present time.

By specially directing the attention of the owners, or agents of property, to some of the unprotected holes that have come under my notice, compliance with the law, has been in cases attained; and it was hoped in this way that others would recognize the necessity of attending to this matter; but it is now feared that it may be advisable to resort to sterner measures, and with your sanction make examples of some delinquents.

In order that all who live in a mining district may know that there is now a law which can, for the protection of life, be enforced against known offenders, it is required that an abstract of the act be kept posted in a conspicuous place. But unless they who are directly interested, they who have cattle and children liable to fall into the unprotected pits and excavations about their dwellings, take the trouble to make a complaint, they can hardly wonder that the miners sometimes take advantage of their carelessness. That the law should take cognizance of the matter of unprotected pits is undisputed and well recognized as essential, but the absence of the desired effect following the passage of the law in the Chapter of Mines and Minerals, suggests a doubt as to the expediency of keeping the unsuccessful clause referred to, unaltered in the statute book; more especially as in its present form it allows malice to use it as a cloak for revenge under the disguise of attaining the desired object.

Further leases are often taken out by irresponsible persons, who have no more stake in the welfare of the property than the two dollars an area they have paid for them. Others are held by unamenable tributers, working to-day and away to-morrow. Thus there is no means of preventing such persons from committing a nuisance by opening pits and leaving them open and unprotected when they abandon them. I would therefore propose that all applications for leases should be accompanied by bonds of two local sureties binding the lessees on abandoning their claim to leave the property safe for the public and the land owner, just as licenses to search for minerals, other than gold are now issued, subject to bonds to indemnify the land owner for damage done to his land. As a convenience for reference I append the following extracts from the mining laws of Great Britain.

#### *METALLIFEROUS MINES REGULATION.*

"13. When any mine, to which this Act applies, is abandoned, or the working thereof discontinued, at whatever time such abandonment or discontinuance occurred, the owner hereof, and every other person interested in the mineral of the mine, shall cause the top of the shaft, and any side entrance from the surface to be, and to be kept securely fenced for the prevention of accidents.

Provided that—

(1.) Subject to any contract to the contrary, the owner of the mine shall, as between him and any other person inter-

ested in the minerals of the mine, be liable to carry into effect this section, and to pay any costs incurred by any other person interested in the minerals of the mine in carrying this section into effect.

(2.) When such abandonment or discontinuance has occurred in the case of a mine before the passing of this Act, this section shall apply only to such shaft or side entrance of the mine as is situate within fifty yards of any highway, road, footpath, or place of public resort, or in open or unenclosed land, or not being situate as aforesaid, is required by an inspector, in writing, to be fenced, on the ground that it is specially dangerous.

(3) Nothing in this Act shall exempt any person from any liability under any other act or otherwise. If any person fail to act in conformity with this section he shall be guilty of an offence against this Act. Any shaft or side entrance which is not fenced, as required by this section, and is within fifty yards of any highway, road, footpath, or place of public resort, or is in open or unenclosed land, or is required by an inspector, as aforesaid, to be fenced, shall be deemed to be a nuisance within the meaning of section eight of the nuisances Removal Act for England, 1855, as amended and extended by the Sanitary Act of 1866.

#### *General Rules.*

"(6.) The top of every shaft which was opened before the commencement of the actual working for the time being of the mine, and has not been used during such actual working, shall, if so required, in writing, by the Inspector of the district, be securely fenced, and the top of every other shaft which, for the time being, is out of use, or used only as an air shaft, shall be securely fenced."

---

## PROSPECTING

### FOR MINERALS OTHER THAN GOLD.

As there was little immediate inducement offered to holders of Licenses to search and work to prospect their areas in the hopes of showing their value and effecting a sale, little was done in the way of exploration during 1875.

The following comparative statement shows that the area of lands held under mining rights were smaller than those secured two years ago.

Year.	Licenses to search.					Licenses to work
	1st	2nd	3rd	4th	5th	
1873	313	111	52	23	7	95
1875	229	75	20	4	1	87

During the past year the rights were held most numerous ly in the Counties of Cumberland, Pictou, Cape Breton, Inverness, Colchester, Antigonish, Richmond and Victoria in the order given.

## COAL MINING.

### CUMBERLAND COUNTY.

The trade of Cumberland County alone shows an increase exceeding by 11,000 tons that of the previous year. The increase steadily rose from 14,000 in 1872, to 26,000 in 1873 and from 49,600 in 1874, to 60,944 tons in 1875. The local sales were 1,000 tons of round and 1,000 of stock, in excess of the year before; and the exports to New Brunswick increased 11,000 tons; while the trade with the United States decreased 2,000 tons. These figures are given in round numbers.

The Spring Hill and Parrsborough railway was again taken in hand, and the work of grading and bridge building pushed on, and almost, if not fully, completed. It is expected that the rails will be laid during the coming season. The completion of this railway, and the construction of an efficient dock or pier at Parrsborough, should permit of a further steady increase of the coal trade of this County.

On lease 31, adjoining on the south, that of the Joggin Coal Mining Association, a bore hole was put down at the corner, where the road turns in to the Joggin mine, and the Joggin main seam pierced at the depth of 1028 feet. The hole was made by an American Diamond Drill, owned by Mr. John Logan and others, of Pictou, the same that was mentioned in the last report, as having done its work s



satisfactorily in Pictou County. Mr. Logan states that the actual time occupied in drilling the hole was 47 days, but as they had the misfortune to break the force pump on tapping a strong spring of water, there was a detention of six weeks during which time the men were still kept on wages, and the expenses were consequently greatly increased. Even then the whole expenses including the moving of the machine, railway freight and fares, erecting derrick, fuel, labor, &c., only amounted to \$937; and allowing fifty cents per foot for wear and tear the average cost of the hole, 1028 feet deep, was only \$1.41 per foot. A hole of that depth bored by hand would have cost more than three times the amount. The machine was worked night and day by a man and a boy, on each shift. In the first length of 500 feet, 42 feet was the greatest depth bored in one day; in the second 500 feet, 29 feet was the best day's work. The spring of water tapped by the hole was so strong, that the water flowed out of the top of the tube 15 feet above the surface. Had it been desired to sink an artesian well, a better site could not have been selected.

The work of exploring with the English Diamond Drill was discontinued after the boring of one or two more holes, and the machine was sent out of the country. It was used on the areas leased to Mr. Domville, on what is called the property of the Spring Hill and Parrsborough Railway Company, and a bore hole 350 feet deep, was put down through the measures overlying the Black seam to the West of the school-house fault. Two overlying seams, before unknown, were discovered; to both of which the cores gave a thickness of three feet. But two trial pits sunk on the crop of one of the seams, proved it to have a thickness of 7 feet 4 inches, to 8 feet. The other seam underlying about 60 feet was not similarly proved. The drill was then taken to the Nova Scotia colliery and a hole bored from the bottom of the furnace pit to a depth of 500 feet in 22 working days. It was subsequently taken back to the Joggins, where a second hole will be put down.

The school-house fault is said to be a down-throw of 600 feet, and from it the explorations have traced the Black seam in a direction east of south, a total distance of 1,400 feet without finding any indications of other troubles. The extreme southern limit of the series of trial pits, show the seams to be rapidly turning to the east, and apparently to conform with those some time ago discovered on Mr. Sharp's area.

## **MINES REPORT.**

---

No other reports of explorations made in this field have been received, except from the New Dominion Coal Company, who have further proved the seams on the area of the town of A. J. Smith. The level on the main seam has been driven 400 feet, and from it two drifts have been driven westerly, which have intersected two other seams; the first is 3 feet 3 inches thick, at a distance of 16 feet, and the second is 4 feet 6 inches in thickness, at a distance of 29 feet from the main seam. It is expected that a slope will be put down on the main seam during the ensuing Summer, to test the quality of the coal to the deep. The seam varies in thickness from 3 feet to 5 feet 6 inches, with a parting of fire clay, which, under more of the cover of the hill, is only 6 to 8 inches in thickness.

## **COLLIERIES.**

### **SPRING HILL.**

The mining of coal from the West or Hall slope has been stopped, the workings alone being kept free from water. In the East or Byers slope the levels have been so extended that the faces are now 800 feet apart. The level going eastward has met with some difficulties, being first troubled with a fall in the floor, and then with a thickening of the parting. The rooms have been driven horizontally 12 feet wide, leaving pillars seven or eight yards in thickness. One counterbalance has been put up on the east side, and two on the west, to lower the coal from the upper rooms to the level. The workings are drained by a direct acting steam pump, which forces the water a vertical height of 437 feet, through a column 820 feet long. The pump has a 22 inch cylinder, 12 inch stroke, and nine inch plunger. To clean the slack of dust and fire clay, and to prepare it the better for market, a screening apparatus has been erected. The coal from the screen is hoisted by a small engine 42 feet above the track, and passed through a circular screen four feet in diameter and 22 feet long. The upper nine feet is of five-eighths inch mesh, then follows four feet of half inch mesh, and then nine feet of seven-eighths inch mesh. The coal that passes through the upper lengths is thrown away, and that which goes through the lower lengths is called nut coal.

The fine coal which is thrown away, possibly might, if it were washed, make good coke in a proper oven. The rough experiment noticed under the head of Coke cannot be

---

accepted as a final test of the value of this coal for coke, and as there is every likelihood of the demand at Londonderry being large a proper trial should be made.

#### SCOTIA.

No coal was drawn from the pit of this colliery during the summer, when some changes were made in the roads underground. Flanged wheels have been substituted on the new tubs for plain wheels, running within a guard on a wooden rail. A place 400 feet east of the slope has been put up to the surface, and made a travelling and air-way. The level extends about 700 feet from the slope bottom.

#### JOGGINS TRACT.

When this area of four square miles was disposed of to the present owners, it was equally divided between the two companies, the Joggins Coal Mining Association, and the Joggins Coal Mining Company; the former taking the old workings on the Joggins main seam, and the latter taking the northern section containing the Hard-scrabble seam.

#### JOGGINS SOUTH.

The Association did not mine so much as in late years, for their trade with St. John was affected by the coal sent in there by rail from Spring Hill, and by vessels accepting low freights from Cape Breton. In the pit the levels of the lower lift have been extended, and the faces are now about half a mile apart. The pillars in the first working are left 6 yards thick, and the bords of the same width, are driven 350 feet, or to within 15 yards of the next plane-way, and then the pillars are brought back. The fire-clay from the parting thrown behind, stows up the places, and allows the roof to settle without falling. Owing to the slackness of trade the pillars were left standing the latter part of the year. A direct acting steam-pump, with a 14 inch cylinder, and 7 inch plunger has replaced the force pump which was worked by rods carried down the slope from the surface engine.

Above ground an apparatus has been put up for separating the duff from the slack. An endless chain with shallow cast iron buckets, similar in arrangement to grain and saw-dust elevators, carries the slack from the main screens up into the upper end of an inclined circular sieve made double; the inner separated 3 inches from the outer, and made of a coarser mesh to prevent the clogging of wet coal. Only the fine that passes through both is thrown away.

## CUMBERLAND.

The Joggins Company have opened this colliery on the beam at Hard-scrabble. The slope has been started a third of a mile from the shore and driven down 270 feet, at which depth levels have been started to the right and left. An inclined tunnel 400 feet long, through the cliff, connects the mine with the wharf. The winding engine has two horizontal 1 inch cylinders, 30 inch stroke, and geared three to one to a drum 8 feet in diameter. The three boilers, 25 feet long and 2 feet 9 inches in diameter are hung from baulks of timber, and are all three fired together.

## LAWRENCE.

A few tons were taken out of this mine to supply the local demand; and from the area held by

## GILBERT SEAMAN,

on the River Hebert, some 500 tons were mined for the use of the Freestone Quarries, at the Lower Cove.

## PICTOU COUNTY.

The total coal sales of this County, while they exceeded those of 1873 by some 3000 tons, show a decline, when compared with the trade of the year before, of nearly 21,000 tons. A quantity which is less by some 20,000 tons than that the sales of the Acadia Company are short of their annual average. That company has again yielded the first place in the list of shipments, which for some years it held, and the Albion Mines has regained its old supremacy. The falling off, in the home consumption is small, 4,000 out of a total of 107,000 tons; in the United States trade it is very considerable, over 29,000 tons; and in the trade with the West Indies nearly 17,000 tons. These heavy losses of trade were in part balanced by the considerable increase in the shipments to the Province of Quebec, 32,000 tons more than the 16,000 sent in 1874. The trade with other markets showed fluctuations of little moment. There is one increase yet to be noticed, that, in the demand for slack, which has steadily advanced, Prince Edward Island being the largest customer, and taking 26,000 tons.

In the general article on the Trade with the United States, explanations are given of the probable reasons for the falling off in the Pictou trade with that country; but, although there is

little prospect of a demand for gas purposes again arising, should the import duty be taken off and the iron industry revive, that industry will likely require large quantities of this coal, which is so well adapted for its purposes.

## COLLIERIES.

### ACADIA.

The large reductions in the sales from this colliery compared with those of late years, are stated to be due to the unwillingness of the owners to sell at rates lower than those which they had fixed as the minimum. Certainly no other reason is discernable, for the workings have never been of late years in so good a condition to do a large business, and the quality of the coal of the seam worked is beyond dispute.

In the pit the lowest lift, which gives a winning of 350 feet and a total length to the slope of 1575 feet, has the levels so extended that there are, at the present time, some 32 bords broken off from the existing planeways, and sufficient room for two new planeways, 600 feet inside, to be started.

In the lift above the pillars are being taken away. The system now adopted is to begin in the pillars five or six yards back from the fall, and work towards the broken. In this way very little of the upper coal is lost, and the falls are not so heavy as before. The great difficulty in working the pillars in this seam arises from the seam being thick and lying at a high angle of inclination. Hitherto the whole of the good coal in the lower bench of the pillars has been lost. It is now proposed to leave this coal untouched in the first working, and bring it all back from under the fall. If this can be profitably done a great saving of coal will be effected. The systematic trials that have been made to work this seam to the most advantage, are deserving of praise. The nut from the coal of the Acadia seam is much sought after for house use, and answers admirably in the Dubuque and other soft coal base-burners.

### ALBION MINES.

The pair of stone drifts from the Main seam in the Foord pit, have reached the Deep seam, at a distance of 185 yards, and proved it there to contain 20 feet of good coal. The stone parting, which is 4 feet thick to the rise, was found only 9 inches thick, and the overlying coal to have increased from 4 feet to 4 feet 6 inches in thickness. This satisfactory condition of the seam, has induced the starting of an incline, from the Cage pit workings, in a south-easterly direction, to open



by the terrible explosion of May 1873 all the officials, who could give accurate information as to the extent of the work not shown on the plan, were lost. Although care was taken, with the intention of leaving a barrier of solid coal intervening between the old and new workings, and rooms were stopped that were thought to be approaching the old workings, a connection was made through one of the rooms above, and fire-damp that lay inside, pouring through, ignited at a lamp and set fire to the coal. The collier at work was but slightly injured, and all the men escaped, though the pit had to be abandoned so quickly that two horses were lost. This accident confirms the action of the law, which requires proper attention to be paid to the plans. The first attempt to smother the fire was by closing the openings of the pit as tight as possible, and that not proving effective, steam and carbonic acid gas were injected, but also unsuccessfully. Then a strong dam was built in the drift, between Nos. 1 and 4 slopes, and the fire extinguished by water.

The coal mined was taken from the No. 4 slope, and from the pillars above the third level on the north side of No. 2 slope. The pillars on the south side have been so much damaged by fire that it is improbable that any coal will be recovered from them. The workings off No. 4 slope showed that the fault, separating them from those of No. 1, after running straight for about 1000 feet, turns southerly, and it will probably be cut by the continuation of No. 4. The heavy fault bounding the workings on the south-west also so turns; an attempt will be made to prove by a bore hole the extent to which it troubles the seam.

The ventilation is now controlled by a fan, made at Wilkes-Barre, Pennsylvania. In principle it is the same as the Guibal in use at the Foord pit. It is, however, smaller, 20 feet in diameter and 6 feet wide. The periphery is cased with cast iron segments. The fan is driven by a single 14 inch cylinder engine, and when making 36 revolutions per minute, produces a ventilation of 59,000 cubic feet of air. The fan is set back some 20 feet from the old furnace pit, to which the returns are conducted, and a covered incline way leads the air direct to the centre of the fan. This is a better position for a fan to occupy than to have it close to the upcast, for the draught is better; and then, should an explosion occur, the covering of the pit would be alone knocked away, the fan would remain uninjured and ventilation could speedily be restored by a temporary covering of canvas and boards.

#### NOVA SCOTIA.

The levels to the north have been further driven, and at the face of the workings the seam appears to be more highly incline

## **MINES REPORT.**

---

the slope. The slope has not been sunk any further. A fault which last year was reported as having been discovered. In the article on Direct Acting Steam Pumps, the arrangement found at this colliery of turning the exhaust steam of the engine into the suction of the pump is mentioned. At present the arrangement has been given up, because the engine was found to heat the water so much that the column of water was strained, and the flanges sometimes broken. The water is still pursued in the auxiliary pump, which throws the water from the lowest level up to the main pump on the fourth level.

A new apparatus has been devised for cleaning the slack, instead of using it as was proposed, and it is found to satisfactorily perform the purpose required. Underneath the ordinary screens, there are the bars three quarters of an inch apart, are other screens, of half inch mesh, hung by short rods, parallel to the main screens, and tied together by rods. They are given a reciprocating motion, which effects the necessary separation of the coal from the slack, by means of an eccentric on a shaft connected with a small oscillating engine.

### **VALE.**

Changes have been made in the method of working the seam at this colliery. The pillars are now left 20 feet between the bords have been widened to 16 feet. A second level has been driven below the main level as an air and water level, and horses have been introduced to facilitate the transit. On the west side a fault of 20 feet has been met with and

on the surface there are now 92 tenements for the accommodation of the workmen. Near the junction with the Pictou Railway a locomotive shed has been put up, and a new engine has been obtained, suitable for the ordinary gauge to which the track was changed during the summer.

No work of any moment was done on Mitchell and Barton's

---

## **CAPE BRETON COUNTY.**

The continued decline in the production of coal in this County is a source of much suffering to the mining population, and it is greatly to be feared that unless a change for the better takes place in the trade, numbers of the men usually



engaged about the mines will have to seek elsewhere for work, and in new occupations find employment. For not even in the United States are the collieries open to them, since the trade is there equally as dull and overdone as it is here.

Comparing the past with the previous year, there appears a total decline of 32,314 tons; made up principally in the reduced shipments to the United States and West Indies, to which countries, dull as the trade was during the preceding year, nearly 18,000 and 15,000 tons more were then sent. The home consumption merely shows an increase of three hundred tons. The trade with Newfoundland shows alone a marked increase, some 5,000 tons. This advance, however, can hardly be considered permanent, as the supplies were unusually short in St. John's, during the winter of 74-75, and those held in the present winter of 75-76 are unusually large.

The anticipated completion of the Sydney and Louisburg railway was frustrated by the failure of the Company who undertook to build it. This is much to be regretted, as it was hoped it would test the convenience of Louisburg as a winter port of call for ocean steamships short of fuel. It is, however, expected that arrangements may be made, which will allow of its completion during the current year.

## COLLIERIES.

### SYDNEY.

The two collieries of the General Mining Association, Sydney and Lingan, shipped over one-third of the total shipments from Cape Breton. The workings of this colliery were in a better condition than in 1874 to supply the steady demand for coal, which it secures, even if other collieries of the County lie idle. A borehole from the workings of the new winning relieved the Queen pit workings to the deep of the water, which of late years has contracted the available area of the pit, and the working places on the south side to the rise have passed beyond the trouble which interfered somewhat with the size of the coal delivered. A section of pillars on the north side of the pit has been worked. At the new winning the pumping pit, which was sunk to the seam in the autumn of 1874, has been temporarily fitted up to draw coal in single tub cages until the permanent winding shaft is completed. A heapstead has been erected for screening and preparing the coal for shipment, and the branch railway has been completed to convey it to the shipping wharf. Underground increased standage for water is being provided, and working places are being won out, with a

view to raising an increased quantity of coal during the ensuing season. Meanwhile the sinking of the shaft, originally intended for the hoisting shaft, is being proceeded with. A drift has been driven from the pumping shaft underneath the second shaft, and some fifty feet below the measures that carry the feeder of water; and a bore hole has been put through from the bottom of the shaft to draw off the water while the sinking goes on. At the present time the upper length of tubbing, similar to that placed in the other shaft, is being put in to shut off all the leakage from the top downwards. When this is accomplished, the depth remaining to be sunk will be about 300 feet. At one time the feeder gave 1000 gallons of water to be pumped, but now it has been reduced to about 700 per minute.

#### LINGAN

The pumping out of the water, that was allowed to accumulate in the workings after the accident in 1873, was again resumed in May, and is still continued. As soon as the water was lowered sufficiently to allow an entrance, the new pair of levels, started in the previous year, were continued and driven by a double shift of men. The water is now nearly removed from the entire extent of the workings, and the mine is again in good working order. The principal workings during the season were in the new district where some sixteen rooms, 6 yards wide, and separated by 12 yard pillars, were broken off. Heavy falls in the slant road, where the fire took place, delayed the work of opening up the south side, where the mining was confined to the removal of a few pillars.

Owing to the depressed state of the trade, the completion of the new winding engine, and other projected improvements have been deferred.

#### COLLINS.

The property at the Little Bras d'Or, adjoining that of the Federal Mining Association on the south, known as the Collins mine, has been purchased, it is reported, by the Toronto Coal Mining Company; but the transfer does not appear on the register. The old slope, known as Guthro's, has been driven to the surface and to the deep, and has now a total length of 528 feet; it is to be made the working slope of the mine. A tramway and wharf have been built, and other preparations made for shipping from the Little Bras d'Or during the ensuing season.

#### INGRAHAM.

This adjoining property contains the out-crop of the Indian Cove and other underlying seams, and a level has been started to win a slice of the crop coal to supply the local demand.

## VICTORIA.

The output from this colliery was some 3000 tons more than in 1874, though it is still very moderate in amount. The only change to be noted beyond the inevitable wear and tear, has been in the pit. From the lowest levels off the main slope at a depth of 985 feet, subsidiary inclines have been driven on the extreme dip, about 135 feet, which give three horizontal bords. The coal is brought up to the lowest main level by having three bords working to the rise at the same time, and providing an equal quantity of coal. Then, by having the descending tub to counterbalance the other ascending, a horse is able to supply power to produce motion. Since the system of working has been changed, from driving the bords to the rise to driving them parallel to the level, better coal is got with less powder, ventilation is better and easier, and less anxiety is occasioned on the score of gas collecting at the faces. The coal is quite dry to the deep and easily wrought; by shearing on the low side, and taking one fall out with powder, the proud state of the coal makes the rest work and come away in blocks soon after it is holed.

## RESERVE.

Owing to the Cape Breton Company, the reputed owner of this, the Emery, and Schooner Pond collieries, having gone into liquidation, active mining has been suspended. The pit was reopened in February by pumping out the water that had collected to a depth of 600 feet in the slope, and mining prosecuted until June; since which time no other work than pumping has been done. The slope has been extended 114 feet, which gives it a total length of 2085 feet. A distance of 230 feet more will bring it to the bounding barrier. The air crossings have been enlarged.

## EMERY.

This colliery was reopened in March, and the water which had collected to a depth of 1100 feet in the slope, was pumped out. The pit now makes about 6000 gallons an hour, and is kept free by two of Cameron's patent special pumps. Mining in this pit was also stopped in June, after some 8000 tons had been extracted. The slope has now a total length of 1208 feet, and has about 290 feet to go before it reaches the boundary of the area.

## SCHOONER POND.

The pit remained closed, but some 1600 tons of the coal in stock were disposed of.



---

INTERNATIONAL.

In the system of working, and in the plant of this colliery no change has to be noted. The sales exceeded those of the previous year some 12,000 tons, and rank next in quantity to those of Sydney mines in the county list.

## GARDINER.

Like nearly all the Cape Breton collieries this is now in a condition to put out very much more coal than there is at present a demand for. The shipments, compared with those of the previous year, show a falling off of over 3000 tons. The only noteworthy change to be mentioned is that the boilers are fitted with Bayley's steam-whistle, which indicates extreme high and low water; but judging by the care that is taken of the machinery the warning must be seldom required.

## ONTARIO.

The output from this colliery was of the usual amount, a little over 5000 tons. A portable engine, somewhat more powerful than the one it replaced, is used to bring the coal up the slope. The operations in the pit have been of the ordinary character.

## BLOCKHOUSE.

In common with several other collieries, the pit lay idle during the winter of 1874-5. In the spring, however, some business was made by the demand in Halifax, the drift ice on the coast preventing vessels getting further to the eastward than Cow Bay. The business of the year fell a good deal short of that of the preceding.

Late in the autumn, an explosion of one of the steam boilers occurred, and did much damage to the engine house. Fortunately, it was unattended by loss of life. A further notice of the explosion will be found under the heading, Accidents.

## GOWRIE.

No change of moment has to be noted in the pit workings. The amount of work done has been a decrease as at many other establishments, though at this but to a small extent.

At the new winning, the sinking of the pit is still standing within 10 feet of the coal, awaiting busier times to warrant the completion of the works. The machinery for hoisting is in position, and the fittings are very substantial and complete.

The breakwater, which protects the shipping pier, and makes a refuge for vessels in the Bay during storms, has been purchased from Messrs. Archibald & Co., by the Dominion Government, and is being put in thorough repair.

#### SOUTH HEAD.

A small quantity of coal was raised and shipped by this colliery after the pit had been put in order, and a shipping wharf contrived. The work of restoring the wharf, which had been built and destroyed three years ago, was begun in June. Of the old wharf the outer block alone remained; three intermediate blocks were put down, and from trestles on them wire ropes were suspended. On this were placed ties and rails; and the wagons ran over them from the cliff to the end of the wharf. This super-structure has since been destroyed by an autumn gale.

#### PROSPECTING.

Has disclosed, it is reported, a three feet seam of coal on L. Cras' area, near Sydney; and a six feet seam by Neville and others, in the Cow Bay basin west of Sand lake, probably one of the Long Beach seams.

---

### VICTORIA COUNTY.

New Campbellton has been the only colliery open in this County. The work of opening out the lower lift in the pit has been continued, and the north level has been driven 410 feet, and the south 240 feet. It is proposed to drive a level to cut off the surface water, which is heavy; it will require to be about 15 chains in length. Scales to weigh the coal have been set up, and a locomotive engine imported but not yet used. Sheds, capable of holding 1500 tons of coal, have been erected to protect the banked coal from the weather. This precaution is most wise, and might, I feel assured, be followed with profit by other companies, who find it necessary to give employment to their men during winter months by banking coal.

---

### INVERNESS COUNTY.

On the area adjoining the Cape Breton Company's property at Port Hood on the north, and held under license to search by E. D. Tremain and others, a slope has been begun and driven in the seam to win the coal lying under

the waters of the harbor, held under lease by Dr. Murray of New Glasgow. The slope has been driven, by agreement, through ground not held by the company at work; it will enter the area leased at a distance of 478 feet on the pitch of the seam, and have a minimum cover of 150 feet. At 600 feet there will probably be a sufficient cover of solid measures to permit a proportion of the coal to be removed to the deep of that point. The slope dips at an angle of  $23.5^{\circ}$ , N. 70 W. It starts about 2220 feet north of the slope worked some years ago by the Cape Breton Company, but now abandoned, in the same seam worked by Mr. Pelton; and about two hundred yards north of the Light house. It is now down about 400 feet, and a return slope is driven parallel to it to a depth of 250 feet. The main slope is 10 feet 9 inches wide, and 6 feet high.

A hoisting engine has been erected, and is now at work. It has a single 12 inch cylinder, with a two foot stroke, and a drum 6 feet in diameter. Steam is supplied by two plain cylindrical boilers, 30 feet long, and 30 inches in diameter.

A bank head has been erected, which will give a height of 20 feet for the screens. No workshops or dwellings have had to be erected, as existing buildings have hitherto satisfied the requirements of this which has been designated the Port Hood colliery. Mr. J. P. Lawson is the agent and manager; he reports that the site of the wharf has not yet been fixed, and that no arrangements have yet been made for the building of it or the railway.

The destruction of the bar which connected with Smith's island exposing the harbor to the north winds, is a great drawback to the opening of any colliery on this shore. As the public wharf, 500 feet long, is fast silting up with the drift from the north; it is thought by men who have had some experience at such work on the coast, that sunken blocks, well balasted, would, with comparative quickness, collect the drift, and that in this way the bar might be restored. Of course the expense would be very considerable. The growth of Dean shoals since the destruction of the bar, shows the great tendency of the drift to accumulate under lee of the island.

At one time it was hoped that the seams under the waters of the harbor might be won by a shaft sunk on the island, but the lower carboniferous rocks of which it is composed, point to a serious dislocation, and a probability of cutting heavy feeders of water in the event of any attempt being made.

The Cape Breton Company shipped outside the Light, but the ice was there very destructive to the wharf. To slip inside a wharf of considerable length will be required.

### COLCHESTER COUNTY.

Trial pits have been sunk at two localities in this county in search of coal; on the banks of the North River, and at the base of Folly Mountain. On the North River about seven miles from Truro a seam of impure coal was found dipping north and very highly inclined. The indications were not considered sufficiently favorable to warrant further explorations on the seam.

At the base of Folly Mountain near where the Steel Company of Canada have opened the iron deposits of that section, two small seams of coal are reported to have been discovered. At the time of my visit to the district the trial pits were full of water, so that I am unable to verify the following statement: "The outcrops of the two seams are 536 feet apart, and steeply inclined dip towards each other. The one dipping south is 20 inches thick and the other dipping north 18 inches thick." They are probably the outcrops of the same seam confined in a narrow basin at the foot of the mountain. The quality for crop coal seemed to be very fair, but the thinness of the seam and the high angle at which it rests make it doubtful if it will be anywhere found worth working.

The outcrop of a small seam has been found at several places along the base of the Cobequids all the way to Reville Bay, and it likely belongs to the same horizon below the main coal measures.



## COAL ANALYSES.

SEAMS.	Specific gravity.	Moisture and Volatile matter.	Fixed Carbon.	Ash.	Sulphur.	Coke in lbs per ton.	Cubic feet of gas per ton.	Candle power.	C. ft. of gas purified by 1 bus. Line.	Authorities.
Joggins, (Main)....	...	38.80	56.00	5.20	...	...	...	...	...	Dawson.
Victoria.....	1.34	36.00	51.84	12.16	...	...	9,340	...	...	...
Spring Hill, (13 feet seam) ....	...	25.38	60.95	13.67	...	...	...	...	...	How.
Black seam 11 ft. ....	...	35.39	60.46	4.15	.22	...	...	...	...	Woodhouse.
Albion, (Main)...	1.32	31.08	64.94	3.98	.31	...	...	...	...	Hartley.
Albion, (Deep) ...	1.33	29.63	56.98	13.39	.77	...	7,180	15	...	Dr. Percy.
McGregor.....	1.32	22.90	67.85	9.35	...	1640	9,500	13	...	Johnson.
Stellar.....	1.10	66.56	25.23	8.21	.00	...	...	...	...	Dawson.
Acadia...	1.32	34.37	57.57	7.55	.50	...	...	...	...	How.
McBain.....	1.36	25.45	62.63	11.92	.49	...	...	...	...	Broome.
Collin's.....	1.27	36.75	57.10	6.06	...	...	...	...	...	How.
Blockhouse.....	...	38.80	55.80	5.40	...	1460	10,217	17	2304	Broome.
Phelan.....	1.32	31.94	62.79	5.25	3.75	...	9,500	16.5	...	Broome.
Emery.....	...	35.47	61.67	4.35	2.17	...	9,500	...	...	Broome.
Lorway (Gardiner) ..	...	38.10	58.45	3.45	...	...	...	...	...	How.
Hub.....	1.27	31.75	66.85	1.40	1.21	...	...	...	...	Chapman.
Harbor.....	...	34.33	61.97	3.70	1.18	...	...	...	...	Dr. Torrey.
Lingan.....	1.28	36.54	62.53	.93	...	1484	9,560	13	1945	Manhattan Gas
Ross.....	1.33	28.62	65.85	3.24	2.29	1342	10,080	16	...	Harrington.
Sydney (Main)....	1.30	36.28	58.56	5.16	...	1480	9,846	16.7	1850	Harrington.
Edward's.....	1.27	30.21	67.78	2.01	.90	...	...	...	...	Harrington.
McAuley.....	1.33	38.50	56.50	5.00	...	1440	10,106	17	2314	Manhattan Gas
	1.30	34.09	62.92	2.99	2.29	1441	9,900	17	...	Harrington.
	1.33	35.20	60.80	4.00	...	1450	9,520	13	2200	Imperial Gas.
	1.30	34.23	63.98	1.79	.77	...	...	...	...	Chandler.
	1.33	30.03	66.91	3.06	...	...	...	...	...	Harrington.
	1.33	38.70	58.40	2.96	...	...	...	...	...	How.
	1.33	26.94	67.57	5.49	...	...	...	...	...	Dawson.
	1.30	31.87	64.59	3.54	...	6,500	...	...	...	Johnson.
	1.27	34.18	61.50	4.32	1.24	...	...	...	...	How.
	1.33	36.74	56.97	6.27	...	...	...	...	...	How.
	1.33	28.88	60.45	7.25	3.42	...	...	...	...	Chapman.
	1.33	36.15	58.01	5.70	2.34	1510	9,000	15	...	Richard.
	1.33	32.07	64.43	3.50	2.86	...	...	...	...	Harrington.

For other analyses see How's "Mineralogy of Nova Scotia 1868," and the Geological Survey Reports of Progress.

## GOLD MINING.

---

Among the tables appended to this report will be found a general Annual Summary and a recapitulation of the produce of each district from 1862 to 1875 inclusive. Statements are also given with them which show the approximate yearly average yield per man per day, and year. No system of collecting returns was not established until the quantities obtained during the previous year of gold was first worked in the Province, have to be ascertained. Mr. A. Heatherington, who took great pains to collect data, estimated the yield at 6000 ounces, which must be added to an annual percentage for that stolen and unreported in order to get at the sum total of the gold produced. He estimated the quantity not reported at 10 per cent. Admitted that I have no means of verifying or questioning; whatever may have been the amount so to be accounted for in the first years of the industry, I feel very sure that of late years it has not exceeded 2 per cent. That small lots of sumably stolen gold have not been reported is strongly suspected; but the opportunities now for disposing of stolen gold are not very great, and those that do exist might be rather reduced were gold miners to see that the Larceny Act of 1869, Chap. 21 respecting "Larceny of Gold" was enforced. Small lots are said to have at times been bought by jewellers who have made no return of their purchases to the Commissioner; and who, it would seem, are always sufficiently careful to be sure of the honesty of those of whom they buy. It is also said that liquor dealers received gold from liquor-sellers living in districts where by law no liquor should be sold. The liquor-sellers were taken in payment "sights" stolen by workmen from the mine or the mill. The action of the Legislature in prohibiting the sale of intoxicating liquors in gold districts was a official one; and it is to be regretted that the law has not been enforced in all, for where it has not the sale has a marked demoralizing effect on the district. The good done is observable at Goldenville where a combined police force has kept the traffic from the village, and where a high degree of honesty is the better maintained.

It is satisfactory to notice that an increase has taken place, in the total production of gold, in the Province. All the districts, except Montagu, Wine Harbor, and the unproclaimed, show a yield greater than that of the year before. The total increase is 2068 ounces, which makes the production only 644 ounces behind that of 1873, when 11,852 ounces were mined in Nova Scotia. Of the mines in operation, the most valuable are the Wellington at Sherbrooke, the mine worked by Mr. McClure on the Union lead at Waverley, and Mr. Donaldson's mine at Oldham.

In the General and District Summaries, the yield per man per day can only be considered approximately correct, for while there is no reason to doubt but that many of the returns of labor performed have been compiled from actual records, it is highly probable that some have been filled in from memory alone, and on them absolute reliance cannot be placed. Still the proportion is so small, that the value of the general averages can hardly be appreciably affected. It offers, therefore, a comparatively fair basis, on which a true valuation of our gold mines may be estimated.

It is certainly difficult, if not impossible, to judge of the value of a mine alone by the yield per ton as is sometimes attempted. Nor is it right to sweepingly condemn the want of skill in our miners, when they are sometimes unable to make a lead carrying 10 dwts. or more pay, because, it is said, in Australia veins carrying 5 dwts., or even less, are sometimes worked at a profit; for a thin lead yielding twice as much per ton as a thicker lead may not be so profitably worked. Nor does the cost of mining per square foot on the lead alone give correct data on which to found a calculation; but taken together with the thickness of the lead a fair average result may be obtained.

The labor averages, which are given in the tables, are suggestive of the relative values of the several districts. And knowing that labor costs, on an average, somewhat over \$1.25 a day, all the average rates under that amount may be unhesitatingly considered as representing an actual loss on labor alone, besides whatever expense was incurred in connection with the erection of machinery, and in the use of materials about the mines.

To what cause the increase in the yield of 1875 is chiefly due is not easy to determine. Whether the general dullness of business, and the reduced demand for labor, have driven more men to seek employment at the gold mines than

## MINES REPORT.

---

otherwise would have been the case, is a matter of doubt chiefly so, because the average yield per man is higher during 1874. Some credit may possibly be due to the introduction and use of dynamite for blasting in the mines, as the quantity consumed in the gold districts is unknown, it would not be wise to unduly credit it with a credit for which no proofs are supplied.

Returns have been sent in from several of the districts of the number of stamps employed, and of the days that they were in operation. But as sufficient care was not taken to ascertain that the days returned were of 24 hours each, no reliance can be placed on any, except on that from Sherbrooke, which shows that the average for that district was slightly over one ton of stuff crushed per stamp per day. The returns from the other districts have not been entered in the table. The highest monthly average was during the summer, but it did not exceed 1.11 tons per stamp per day. The mills employed the Palmerston gave the highest average, and the return from that mill for the month of August shows that 1.21 tons were crushed per stamp per day.

The keeping of these returns with accuracy is much to be commended, for then the relative efficiency of the several mills would be demonstrated; and possibly a spirit of rivalry among the millmen might be induced by the publication of the returns, which would do much towards increasing the efficiency of both mills and millmen.

In the general summary the stated value of the gold is estimated at \$18 per ounce of unsmelted gold, which is the valuation for calculating the royalty due to the Crown. The actual value of smelted gold varies from \$18 to \$19.40 per ounce, while its average value is \$19.22. The gold of this province is unusually pure and free from base metals, the assays varying from 918½ with 79 parts of silver, to 968½ with 22 parts of silver. The least fine coming from Uniacke's district, and the most from the conglomerate of Gay's river. The quartz veins at Oldham yield the purest gold, 964½ fine, with 30 parts of silver.

## DISTRICTS.

### STORMONT.

The property formerly owned by the Union Company was worked with the adjoining areas in 1874, by Mr. Hattie. The oil overlying the bed rock, immediately south of the property has been profitably milled. Of late, work has been

done at a profit to the tributers, on the stringers from the main lead, which had been left untouched on the south wall.

Another set of tributers have been working in a small way, on the Allan property, and principally on a lead 80 feet south of the Mulgrave lead.

The operations at Johnston's brook have been stopped.

#### WINE HARBOR.

The leads at the Barrasois have been abandoned. All the work that has been done in the district, has been done by tributers, chiefly on the property of the Eldorado Company, who, as a company, have entirely suspended operations. The tributers have been taking the upper unwrought portions of the Plough lead that were left in the first working to keep the walls asunder. They have also been working on the Mitchell lead, taking away the blocks of the vein left between the small claims into which the district was originally granted. On the middle lead a short level was driven to the westward through a fault, to drain a portion that stands at a higher level than the tunnel. The quartz mined by the tributers is crushed for them in the mill owned by the company.

#### SHERBROOKE.

The yield of gold from this district was more than half the total production of the Province, and higher than it has been since 1871; and the value per ton of stuff crushed greater than it has been since 1867. The total yield was 5,818 ounces, of which more than 3,000 ounces were mined by the Wellington Company from areas 620, 621 and 622, Block III. The chief operations were on the Wellington lead, which was re-opened late in the previous year. It confirmed the good opinion its owners had of it, and has warranted them in going to the expense of erecting the new machinery. The original main shaft was 500 feet deep on the lead, and this shaft has since been extended. The principal operations during the summer were to the west of the shaft, as the streak has a course in that direction. The streak of rich quartz being below the level of the shaft bottom, was extracted by means of an incline plane worked by a wire-rope conducted down the shaft from the surface. The pumping was also effected by means of a wire rope. The main pump has two sets 5 inches in diameter, and worked by rods from the surface. The new winding engine has a single horizontal cylinder 16 inches in diameter,

## MINES REPORT.

---

a 30 inch stroke. By means of belting and shafting drives the pumps in both the Wellington and Dewar and hoists from the different shafts. The lead is sometimes thick, and to the west of the slope is thrown to the north by a fault which, if it does anything, enriches it. A small sucker about an inch in thickness on the footwall was found to be very rich where it passed through the 18 inch of slate, but it was found to become poor where it entered the adjoining band of quartzite.

On the Dewar lead which overlies the Wellington, the shaft is down 356 feet, and all the water made in the mine is drained to it. The workings extend 400 feet east to the Rockville property, which drained by these workings has been again re-opened.

Mr. Swickl has taken the Grapevine property, areas 614 and 615, Block III, and he has opened a lead which he calls McClure, and another 40 feet south of it, lying immediately north of the Grapevine lead. The two leads are small, not more than two inches in thickness. They have not been found rich in spots, but the gold streaks are small and do not extend longitudinally more than 60 feet, and on the McClure lead to a greater vertical depth than 160 feet. The machinery belonging to the Grapevine has been utilized.

The workings on the South lead on the Dominion property were for the present closed in August. The slopes extended about 100 feet in length and to a depth of 130 feet.

The extension of the same lead on the Palmerston property was worked until the end of the year and in connection with the Dominion property by Mr. Fraser and others. The stopes extend 170 feet. The same lead, though separated by a barrier from these mines, has been worked on the Meridian property to a depth of 120 feet, and for a distance of 140 feet on the lead. To the east, where it is cut off by cross leads, it is 5 inches thick, and carries about 100 lbs. to the ton; to the west it thickens to 8 or 10 inches, and is rich in spots.

Mr. Cleverdon has been working the Stryker lead, which is about 5 inches wide, on the property of the British Company, to a depth of some 70 feet, stoping it for a length of 100 feet. Sears lead, 20 feet south of the Stryker lead, has not been worked by other tributers. Prospectors have opened a shaft to the south of this belt, and near the old Meridian mine. On the property of the Meridian company a surface shaft was cut for 140 feet in a northerly direction from the

north lead, which exposed the outcrop of two leads, 6 inches and 15 inches wide, which are said to be barren. On the Palmerston property a lead has lately been opened, close to the north lead, which, it is said, does not show in this trench.

On the Chicago property tributaries have been taking the upper portions of the leads which were left when the mines were first opened.

#### FIFTEEN MILE STREAM.

The company of Sherbrooke men continued to work the Jackson lead on areas 884 and 885, until the autumn, when they had the misfortune to lose their horses, owing to the badness of the road, or rather from the absence of one; and they for a time abandoned work. It is to be regretted that the means of access to so promising a district is so bad. At present for part of the way there is but a path suitable only for pack-horses, except of course in winter, when a covering of snow and ice allows a good road to be quickly made.

On the Jackson lead the stopes extend about 100 feet; at the east end is the bailing shaft, and the water is hoisted by horse whims. The lead is one of the thickest worked, being about 30 inches wide at the rolls, which follow one another closely at distances of only 6 to 10 feet. To the east the lead thins, and the rolls are not so large, numerous or rich, as in the western end of the stope, where work in the latter part of the season was resumed. The lead is almost vertical, but it has a slight southerly dip.

Mr. Walton was busy draining his areas and prospecting them. He deepened the brook's course and drained some of the 'stills.' In the same section of the district the brothers Hall paid much attention to draining the swamp, and in their ditches exposed several leads. The subsoil appeared to be rich enough to pay for putting it through a mill. On area 992 they have opened the Island lead, which yields very promising looking quartz.

#### CARIBOU.

The only work done during the year in this district was by Mr. Caffery, on the Hyde lead, on areas 227 and 228. Small parcels of quartz were taken from other areas by prospectors, and altogether some 446 ounces were obtained.

During the autumn work was temporarily abandoned, but it is expected to be resumed during the present winter.





McDonald and Co., reopened the Frankfort lead, on the Sterling property. It had previously been mined along some 300 feet of the crop, to a depth of 20 to 30 feet, and in the centre opened to a depth of 100 feet, where the lead is richer. The late work has been done in the eastern of the two centre shafts, following the gold streak which has an easterly dip. The lead averages 4 inches in thickness.

Prospecting was carried on in other portions of the district, and attempts again made to profitably work abandoned pits. The Dunbrack lead in Block IV, and the Barrel lead were reopened.

#### GAY'S RIVER.

The mining of the conglomerate which lies unconformably on the Silurian slates, and is capped by carboniferous shales, was continued on area 40 until October, when the workings were temporarily closed while the autumn rains continued.

The removal of the auriferous conglomerate has been chiefly from the rise portion of the workings, and from a depression in the bed-rock, which is slate. Pillars of conglomerate have been left to support the roof and props placed, to indicate any subsidence.

A trial pit, 700 feet to the west of the workings, proved the continuous existence of the conglomerate, but the pit did not reach the auriferous portion next the slate, as the water was heavy.

An attempt was made to drift along the top of the bed rock from the bluff, easterly towards the brook, but as the bed rock dipped in that direction, water soon overpowered the workmen. Then a shaft was begun and sunk some 21 feet in the endeavor to reach the bed rock, with the object of proving, if possible, the presence of alluvial gold, in the debris of the conglomerate, but was unsuccessful.

Other parties prospected a little on area 7, on the side of the brook, below the mill-dam, and by washing the conglomerate they succeeded in collecting a few ounces.

#### RENFREW.

The returns show only 48 ounces as the yield of this district, though the number of men at times working there would have suggested a greater return. The quantity does not include some ounces of gold which were said to have been extracted from the tailings at the free claim.

## MINES REPORT.

---

work done partook largely of an experimental character. A little was done on the Preeper lead, areas 342 and search made for its continuation to the west, fault which is supposed to throw the lead to the area 319 the Clements lead, which is 18 inches for a short time worked. It yielded a trifle over the ton. The chief yield was from a lead over-keeper, which was worked by Mr. Macdonald, on for the Hartford Mining Company. It yielded 15 e ton.

### UNIACKE.

miners living in the district continued to work the of the leads on the property of the Montreal Min-iation, chiefly on a lead on area 682, Block II. is from eighteen inches to two feet in thickness, mined by the cross tunnel, which cuts a number of was driven across the measures some years ago, main pumping shaft, at a depth of 108 feet. The work in the latter part of the year, was carried on iacke Gold Mining Company, under the manage- Mr Prince, on area 678. It is expected that there slight revival of interest in the district, and that ce for the current year will be largely in excess of ie past three seasons.

### TANGIER.

Strawberry Hill section, Mr. Townsend, during part of the year, mined on the Dunbrack lead, and some 107 ounces of gold. During the remainder r, he was engaged in erecting a donkey engine, ing and hoisting on the Forrest lead, which he to work during the ensuing season. He has put h steam crusher in repair; the water-mill, hither- a the district, having been too much damaged to ny expenditure on it. Mr. Forrest, the other prin- er in the section, confined his operations on the ead, which lies to the north of the Dunbrack. He a a stope of 70 feet from No. 1 shaft, to a depth of om No. 2 shaft to a depth of 45 feet, a stope 45 No. 1 shaft, and a stope 35 feet east to the same om shaft No. 3, which is 35 feet deep, stopes 25 and 15 feet east were taken. No. 4 shaft is 30 with a stope of 20 feet west. Thirty feet north o and at the western end of his stoping ground, he d a new eight stamp steam mill. The engine o means of belting, will drive also the pumps, and isting.

Some prospecting was done on the property of the Burlington Company, and on new ground to the South of the district.

At Mooseland operations have been continued on the Irving lead, and a stope of 70 feet taken down to a depth of 90 feet. The lead is 6 to 10 inches thick and is worked together with the little Irving lead, a quarter of an inch thick, which in spots has been found very rich.

#### MONTAGU.

The only actual mining in this district was on the cross lead area 1461. A trifling amount of work was done at Bendigo, on area 1166, the property of Messrs DeWolf; on leases 78,83, 84,99 and 103 belonging to Messrs. Lawson; and on a few other odd claims throughout the district. On the cross lead the stope of 25 feet in length has been taken down to a depth of 180 feet. The workings are vertical and as the ladders are also vertical, several sollars or platforms have been put in by the side of the travelling ladders on which men may rest in their ascent. Much new timber had to be put in, as the upper workings had not been opened for some years prior to the previous autumn when operations were resumed. The mine makes a good deal of water which is removed by pumps worked by rods connected with the engine of the mill. The hoisting of the rock and quartz is also effected by the same engine.

The same party of tributers intend to extend their operations and also work the adjoining Sarah lead, which was formerly opened to a depth of 40 feet, using the same mill engine to supply the requisite power.

#### WAVERLEY.

On Laidlaw's hill from area 156 tributers have taken a few ounces of gold. The work done has been to prove, by a shaft 80 feet deep, the presence of a lead further down the ravine towards the lakes than the leads of barrel quartz have been hitherto found. And on Morton's property a drain has been cut to draw off the water from the quarry-like excavation and expose a greater surface of the barrel quartz on the crest of the hill.

The actual mining in the district was on Mr. McClure's property, adjoining that of Mr. DeWolf; chiefly on the Union lead, areas 169 and 170.

Some explorations were made on leads in other areas 174 and 191, but the Union lead was alone steadily worked.

## MINES REPORT.

---

r Mr. Huff's management the returns show very satisfactory yields. The two shafts are 96 feet apart and have been sunk to a depth of 140 feet. The stoping is done on up to the break 24 feet east of the shaft, and a level has been driven to find if possible, the extension of the lead.

A company styling themselves the British Gold Mining Company have taken Messrs. DeWolf's property completely. They have put the stamp mill in repair, and added a new hoisting engine. The work of retimbering the shafts has been very thoroughly done, and 5 shafts under lead, 4 on the North lead, and 7 on the Union lead have been put in working order to a depth of 160 feet. The returns do not show that they have yet extracted much.

### LAWRENCETOWN.

As in the year work was again resumed in this district. The returns of quartz crushed, and gold produced were made until after the year closed.

### HARRIGAN COVE.

Early in the season some 15 tons of quartz were mined and crushed by Mr. Smith, which yielded over nine ounces of gold.

### CRANBERRY HEAD.

From the mine at the Cream-pot over 29 ounces were obtained from 33 tons of quartz during the winter months. Operations have since been abandoned.

---

## IRON.

---

The Dominion of Canada imported during the fiscal year ending June 30th, 1875, pig iron to the value of \$1,229,900; railway bars, fish-plates, frogs, &c., to the value of \$1,454; and during the following three months, pig iron to the value of \$237,103. These figures show the large amount of iron and steel imported into the Dominion for pig iron and wrought bars and steel, and to some degree the extent of the market which home manufacturers may expect to compete. T

---

trade in more detail is shown in the accompanying tables, for which I am indebted to the courtesy of the Hon. William Ross, the Collector of Customs at Halifax.

The great depression that has of late existed in the iron trade has retarded the development of this industry in this Province. But more attention is now being directed to it, as the extent and character of the explored deposits become better known, and some enquiries have lately been made for rich ores to export, for admixture with the ores of Pennsylvania. Prospectors, however, did little or nothing during the past year to open up new ground.

The STEEL COMPANY OF CANADA have confined their operations at Londonderry chiefly to those of a preparatory character, driving adits and levels to open the deposits, and accumulate stocks of ore on the surface, erecting blast furnaces, stoves, engine-houses and dwellings, and building tramways and branch railways to convey the ore from the mines to the works.

The charcoal blast furnace belonging to this company was kept in operation, and produced in the season some 1909 tons of pig iron. An experiment made in it with Albion Mines coke proved the eminently satisfactory character of that coke for use in blast furnaces. An analysis of the coke is appended, and it will be noticed that it contains but a small percentage of sulphur; it is therefore, in that respect especially suitable for iron making.

At the Steel Works, spoken of in the last report, where Siemens' Direct Process has been adopted, a series of tests have been conducted by Mr. Wopplington, the manager. The results are at present private, but they are understood to have shown the satisfactory nature of the process for the treatment of the Londonderry ores. The rotators erected since the last report was written are somewhat different in dimensions to those then given; they are ten feet long by seven feet in diameter.

The house for the blowing engines has been completed, and the foundations for two blast furnaces laid. The furnaces will probably be completed in June, and have a height of 63 feet, a diameter of 19 feet at the boshes, and 5 feet at the hearth. Such furnaces are expected to produce 600 to 700 tons of metal each per week; but as the consumption of pig iron in the Lower Provinces is, at present, only about 6000 tons annually, a market will have to be sought in Ontario and Quebec, and abroad, until the low-



## ANALYSES OF CLEVELAND ORE.

	Magnetic Black Oxide.			Red Oxide.	
Metallic Iron.....	54.22	59.11	53.14	58.05	57.93
Silica .....	14.97	11.64	....	....	17.21
Sulphur .....	.069	.09	....	....	.036
Phosphorus.....	.36	.17	.172	.193	.16
Alumina .....	5.53	....	....	....	.....
Lime.....	2.70	....	....	....	.....
Magnesia .....	.41	....	....	....	.....
Oxide of Manganese.....	.86	....	....	....	.....

At Springville on the East River of Pictou further explorations on the iron deposits of that section were made. The areas, previously held under Licenses, were leased, surveyed, and the corners marked by stone posts sunk four feet in the ground. The surveys also proved the relative position of the areas to one another. Mr. Edwin Gilpin conducted the explorations, and he reports that, on license to work No. 11 which lies to the south of the Big Brook, near the Pictou branch of the railway, the vein of brown ore on that area was proved to be 3 feet in thickness, and that its extension was followed one-third of a mile to the Westward. While prospecting several beds of drift brown ore were intersected, which Mr. Gilpin thinks could be profitably worked. On license to work No. 7 a bed of red hematite 12 feet wide was discovered, and on lease No. 28, which is known as the Ross area, the outcrop of a bed of red hematite was found. Other indications of a bed of red hematite appeared on license to search No. 102. Specimens of the various ores, &c., from this locality have been collected for the approaching Philadelphia exhibition.

A limestone found in this neighborhood, which it is thought will be suitable for iron smelting, has been analyzed, and its analysis is given under the heading Limestone.

The extracts which are appended, and taken from the Returns of the Board of Trade of Great Britain, and the Returns of the United States Customs Department suggest the extent to which the business in Iron is carried on in the Dominion.

The MINERAL STATISTICS of the United Kingdom show that the following quantities of Pig Iron were exported to British North America in the years mentioned, 1872, 87,007 tons, valued at 490,288 pounds; 1873, 25,830 tons, valued

## MINES REPORT.

66 pounds; and 1874, 22,713 tons, valued at 104,000.

The last quantity stated is considerably under that shown in the Return of the Board of Trade.

### UNITED STATES BUREAU OF STATISTICS 1874-5.

#### *Value of manufactures of.*

of Nova Scotia, &c.....	\$1.204,000
of Quebec, Ontario, &c.....	1.861,000
of British Columbia.....	115,000
of the West-India Island.....	16,000
as from Canadian Reports.....	1,801,000
	<hr/> \$4.998,000

### THE BOARD OF TRADE OF GREAT BRITAIN.

#### *Quantities and Value of Iron and Steel to British North America.*

	Quantities.		Value.	
	1874. Tons.	1875. Tons.	1874. £	1875. £
.....	30,013	37,489	163,405	152,000
of Bar, Bolt and Rod .....	28,366	22,495	315,553	208,000
of all sorts.....	62,850	85,168	681,343	917,000
of Sheets and Boiler Plates.....	10,282	7,536	164,695	117,000
.....	3,512	4,138	110,168	118,000
of wrought Manufactures ..	26,658	15,860	436,567	247,000

Old iron, unwrought steel, steam engines, and other descriptions of iron and mill-work, if sent, are not included in the above table.

### THE DOMINION IMPORTED, 1874-5.

	Pig Iron.		Railway Bars, Frogs, Plates, &c., of wrought Iron and Steel.	
	Cwts., (100 lbs.)	£	Cwts., (100 lbs.)	£
from the United States.....	548,247	600,355	1,378,807	4,319,000
from Great Britain.....	488,688	622,693	256,405	965,000
from other sources.....	4,955	6,846	.....	.....
.....	.....	.....	1,280	2,000
and ..... 26	.....	75	.....	.....
	<hr/> 991,951	<hr/> 1,229,989	<hr/> 1,631,492	<hr/> 5,289,000

One ton, (2,240 lbs), of pig iron, is therefore valued at \$27. The Board of Trade return for 1875, the pig iron exported from Great Britain is valued at £4 1 5 a ton.

STATEMENT shewing the quantity and value of Pig Iron imported into the Dominion of Canada, by Province, for the fiscal years ending the 30th June, 1874 and 1875, respectively.



PROVINCES.	1874.		1875.	
	IRON—SCRAP, GALVANIZED OR PIG, BARS PUDDLED, BLOOMS, BILLETS AND SPIKES, GALVA- NIZED.		PIG IRON.	
	Quantity.	Value.	Quantity.	Value.
	Cwt.		Cwt.	
Ontario .....	229,990	\$571,974	363,026	\$509,103
Quebec .....		744,288	503,608	546,466
Nova Scotia .....	37,553	69,085	36,221	52,951
New Brunswick .....	8,054	93,524	86,198	116,748
British Columbia .....		2,286	1,940	2,498
Prince Edward Island .....	1,507	4,163	958	2,223
Manitoba .....		541		
	277,104	\$1,485,861	991,951	\$1,229,989

STATEMENT shewing the quantity and value of Pig Iron imported into the Dominion of Canada, by Provinces during the three months ended 30th September, 1875.

PROVINCES.	CWT.	\$	REMARKS.
Ontario .....	49,957	47,520	Hamilton principally.
Quebec .....	221,980	176,812	Montreal and Quebec only.
Nova Scotia .....	3,340	2,671	Halifax principally.
New Brunswick .....	11,700	9,692	St. John only.
Manitoba .....	"	"	
British Columbia .....	"	"	
P. E. Island .....	502	408	Charlottetown.
	287,479	237,103	

## LEAD.

The vein mentioned in the report for 1874 as containing galena near Port Hood, C. B., is of no commercial value. It is, however, interesting on account of its position, being in the sandstones of the coal measures between two seams of coal.

A vein which promises better has been found near Caledonia, in Guysborough County. Beyond exposing the outcrop no work has been done. It is said to be from 8 to 15 inches wide where opened, and to contain bands of pure galena 2 to 3 inches wide, a specimen of the ore is in the exhibition collection, and analyses give the following composition :

---

	No. 2.
.....	86.02
.....	.049
.....	.02
.....	.03
.....	absent
.....	mere trace
.....	mere trace
.....	13.30
.....	trace
.....	.18
.....	.402
.....	trace
	<hr/>
	100.00
.....	17.75

larger vein  
own, it offe

rs been made  
of copper ore  
the soil near  
vein contain  
the exploration  
n ground, n  
rich seems  
ip north wi  
by sinking  
k, over which  
The vein  
onsist chiefly  
The exploration  
, now worked  
e main vein  
ks, an extension  
ed his further  
ed but not the  
he wetness  
ing slates and  
erry in which  
ore associated  
been exposed  
ge of the ore  
Londonderry  
Tolson's Lab

Near Lochaber Lake he has found two cross veins showing copper pyrites, erubescite, and specular ore with quartz as a matrix.

#### COKE.

The successful trial of Albion Mines coke in the blast furnace at Londonderry, and the prospect of a large demand for the article when the new furnaces are completed, has aroused the attention of the coal owners of Cumberland and Pictou. Some coke was made at Spring Hill and an analysis of it is given; but as it was made of unwashed slack in open heaps, a satisfactory result was not to be expected. An experienced coke burner has been brought out to the Albion Mines from England, to superintend the ovens, and the quality under his management is said to have improved. The analysis shows it to contain very little sulphur, and as it is hard and dense it is an excellent coke. New ovens have been built, the set of eight increased to twenty, and a second set of twenty has been finished. The ovens are the "bee-hive," 11 feet in diameter, and 8 feet high; placed in two rows of ten each, back to back, with railway tracks running over the tops that the ovens may be fed direct from the wagons. The forty ovens will make about 240 tons of coke per week.

#### ANALYSES OF COKE.

	Albion Mines.	Spring Hill.
Carbon .....	83.88	81.92
Sulphur .....	.62	1.52
Ash .....	14.52	12.90
Moisture .....	.98	3.66
	100.00	100.00

Hitherto the local demand for coke has been small, and it has increased but slowly. According to the returns the following quantities were made at the several collieries mentioned.

Blockhouse.....	14 tons
Sydney.....	65 "
Spring Hill.....	79 "
Albion Mines.....	1065 "
	1223 "



## ANALYSES OF FIRE-CLAYS.

	NOVA SCOTIAN.			SCOTCH.		
	Lingan.	Deep Seam.	Spring Hill.	Glenboig.	Gartosh.	Glenva.
Silica.....	55.20	51.15	50.47	60.62	56.94	61.72
Alumina.....	32.10	22.57	32.69	33.09	35.21	31.17
Iron oxides.....	1.87	6.48	8.01	4.31	5.11	5.12
Titanic acid.....		1.75	1.88	61	.33	.17
Lime.....		1.27	1.85	63	.95	.75
Magnesia.....	5.53	1.55	2.11	50	.92	.87
Alkalies.....		2.66	1.96	28	.51	.49
Combined water....	5.30	4.23	1.03			
Moisture.....		2.88				
Carbonic acid.....		5.04				
Organic matter.....		1.16				

In a late issue of *Iron* there appeared an interesting communication on Firebricks by a Mr. Whitwell, of Stockton, and from it the following information is extracted:

## ANALYSES OF SEVEN KINDS OF FIRE-BRICK.

	1	2	3	4	5	6	7
Silica .....	93.44	80.84	76.76	64.67	61.57	68.00	63.16
Alumina.....	1.93	17.80	19.40	31.05	30.04	28.25	33.27
Iron, Oxides of....	1.87	.32	1.49	3.47	7.57	1.22	-1.64
Lime .....	3.27	.93	1.30	.72	.72	1.31	.50
Magnesia .....	.31	.45	.64	.67	.73	.90	1.08
Alkalies.....	.15	.16	.0	trace.	.66	32.	.44
	100.97	100.00	99.50	100.58	101.29	100.00	100.09

NOTE.—The Iron in 2, 3 and 6 exists as peroxide; in 1, 4, 5 and 7 as protoxide.

(1.) Pease's West Ganister stands for years in Newcastle coke-ovens, watered inside. Would not stand hot-blast, crumbled into dust.

(2.) Half Ganister (Wilton Fire-brick Co.) stands well

in Newcastle coke-ovens. Supports work in Whitwell's hot-blast stoves well—seven years at least without repairs.

(3.) Stourbridge (Perrens & Harrison), stands Whitwell's stoves well; furnace-heaths and linings; fine finish and face on bricks.

(4.) Newcastle (Cowens), excellent for gas retorts; fine skin; not so good as No. 5 for mill-furnace crowns.

(5.) Stands in mill-furnace crowns fourteen to sixteen weeks; neither drops nor melts down.

(6.) Has been much used for blast furnace linings.

(7.) Suitable for the cooler end of Whitwell's stoves.

The chief point to know is, wherein lies the weak point of a brick. One made of the South Durham clay may melt on account of the iron. Another kind without any specks may melt on account of the lime or alkalies it contains. A fire-clay invaluable for retorts may not be so suitable for other uses; take No. 4, which, perhaps owing to the potash, takes a beautiful glaze in the fire and is free from cracks, but it will not stand in a mill-heating furnace so long as No. 5. Again, the protoxide of iron 7.57 in Shipley No. 5, seems to have no effect on its fire-resisting qualities for mill-furnace crowns, and we use these bricks constantly. They are outwardly speckled with iron, and do not hence *look* so clean, though they stand a white heat from fourteen to sixteen weeks. Many bricks will stand a pure flame of coal or gas which will not do for a blast furnace crucible or a puddling furnace flue or bridge jamb."

#### LIMESTONE.

At many places throughout the country there are kilns for burning lime to supply local demands. For the general requirements, large quantities have been imported from New Brunswick, and Rockland, Maine, where the business of burning lime is conducted on an extensive scale. The Trade and Navigation Returns do not show the quantities imported. Nor does the census of 1871 show the quantity burnt in the Province in that year. It gives the value at only \$18,840; and supposing the value of a bushel to be 25 cents, which is a low valuation, the quantity produced in that year was only 75,360 bushels. In 1851, 114,412 bushels; and in 1861, 136,848 bushels were burnt in Nova Scotia. If the figures in the census of 1871 are correct, the importations must be larger. The port of Halifax in 1874, received 10,670 bushels from New

Brunswick, and 5,560 bushels for the United States. It also received 6,000 bushels from domestic ports.

The matter of lime burning has been made a business of at two places in Cape Breton, at the Marble Mountain and George's River, both on the Bras d'Or; and they are likely to successfully compete for the home markets. The enlargement of St. Peter's canal will greatly facilitate the trade. About 9,250 barrels of lime were shipped in 1875, for sale in this and neighboring Provinces. The exports of limestone from this Province are principally, if not altogether, to Prince Edward Island, where the lime is freshly burnt as required. So far as is known, about 4,800 tons were sent there for this purpose in 1875. Pugwash sent 760 tons, and the Marble Mountain, on the Bras d'Or the remainder.

#### MARBLE MOUNTAIN.

The quarries which have been opened at this locality have exposed immense beds of marble, of which it is proposed, on a future occasion, to make mention. Of late, the owners have confined their attention alone to burning lime from the grey colored marble, near the base of the mountain. An analysis of that variety by Professor How is given.

The company have built two patent draw kilns. They have a cooper's shop and mill for making staves close to the kilns and to the shipping wharf. About 3,250 barrels of lime were made in 1865, some 5,000 in 1874, and 8,000 in 1873, valued at \$1.00 per barrel. Twenty-four tons of marble were quarried in 1875 and sent away as samples; and about 4,100 tons of limestone were shipped to Prince Edward Island.

#### GEORGE'S RIVER

Here also two kilns have been erected, which are capable of burning 85 to 100 barrels of lime per day. During the past season about 6000 barrels were sent to Halifax, Liverpool, St. John's, &c., and were invoiced at 80 cents per barrel. Rockland lime costs, on an average, \$1.10 at the kilns, which leaves 30 cents and a margin on freight in favor of the native burnt lime. At this locality there is also a mill for the manufacture of staves, lumber, shingles, &c. The limestone bed is 20 feet thick, and conveniently situated for shipment.

#### SPRINGVILLE, PICTOU COUNTY.

About half a mile from Springville, on the New Glasgow road, there is a bed of limestone, about 15 feet thick, which is extensively quarried to supply lime for the local demand. It

very pure, as the following analysis, made at the College of Sciences, Newcastle-on-Tyne, shows, and it is expected that it will be valuable at the proposed iron establishment on the river.

	Marble Mountain.	Springville.
Carbonate of Lime.....	94.31	96.26
Carbonate of Magnesia.....	75	2.33
Oxide of Manganese.....		.55
Oxide of Iron.....	45	.57
Alumina.....		.10
Sulphur.....		.02
Phosphoric acid.....	decided traces.	.03
Silica.....	4.35	1.99
Moisture.....	14	.17
	100.00	102.02

#### GYPSUM.

According to the statements kindly furnished by the Customs House officials the following entries show the quantities of plaster shipped to the United States from Nova Scotia during 1875 :

Antigonish.....	925 tons.	\$ 925
Baddeck.....	9,905	9,905
Cheverie.....	15,240	15,240
Hantsport.....	5,625	5,625
Maitland.....	3,445	3,445
Walton.....	1,600	1,600
Windsor.....	57,250	57,250
Halifax.....	880	1,628
Wallace.....	289	289
	95,159.	95,907

#### FREESTONE.

The exportation of building stone was considerably reduced and little or no work was done at the quarries on the shore. Pictou only shipped 17 tons, valued at \$140, to Newfoundland ; Wallace sent 891 tons to Boston, 319 to Newfound-land, 268 tons to P. E. Island, 50 tons to Halifax, and 90 to Montreal ; valued at \$3 per ton, \$4,611. Wallace also exported to P. E. Island 2,083 tons of rubble, valued at 50¢ per ton, \$1,041.

At the Lower Cove quarries at the head of the Bay of Fundy Messrs. A. Seaman & Co., who have hitherto confined their attention to the making of scythe and grindstones, now commence shipping ashler also. They have lately built a



mill, large enough to allow six gangs of saws to be worked. The three that are now set up are capable of taking in blocks of stone 9 feet square by 6 feet thick. This mill is said to be the first in which gang saws have been used for dressing grindstones.

The quarry inland which has been worked of late years, has been, for the present, closed; and the old quarry on the south reef next the shore has been reopened. The largest stone that has been sent from these quarries was lately shipped to a mill at Waterville, in Maine. It was 7 feet 2 inches in diameter, 15 inches on the face, and weighed nearly 8000 lbs.

Messrs. A. Seaman & Co., have reported the following shipments :

To the United States :

1712 tons of Grindstones.....	\$27,892
380 gross of Scythestones.....	1,520
	—————\$28,912

To Great Britain :

100 tons of Grindstones.....	\$1,600
93 gross of Scytaestones.....	372
	—————\$1,972

In the Dominion :

150 tons of Grindstones.....	\$2,400
138 gross of Scythestones.....	552
	—————\$2,952
	—————\$33,836

With the increased facilities now enjoyed at these quarries, it is expected the business may be largely extended, and that the trade with Great Britain may be made remunerative.

**BARYTES.**

Although there are several localities in the country where barytes of fair quality is found, it is alone mined at Five Islands. The quantity exported to the United States in 1875, was 175 tons, valued at \$10 a ton.



lamp up to try for the gas, when it fired and burnt him slightly. A careful examination of the lamp, a Clanny, showed that the glass did not fit close, and that probably the flame was driven out under it. It is said that every care is taken with the lamps, and that they are daily examined by the shot-firers at the stations before the men are allowed to go inbye; certainly they have every appearance of being well looked after. Yet this accident shows that where they are used and trust put in them, too much attention cannot be paid to the condition in which they are kept.

In a former part of this report under the heading INTERCOLONIAL COLLIERY, reference was made to the second explosion which merely slightly burnt the man who set fire to the place.

The third explosion happened at the Vale Colliery on the 22nd of June. William Hyde, a fireman, reported a little gas in a heading and told McPhee, the cutter, to keep away until he had brushed it out. McPhee, however, with a naked light on his head, followed too closely in and fired the gas, which burned them both, but not seriously.

The fourth took place at the Nova Scotia Colliery, also in a heading, on the 28th of the same month. Two men were driving up from the water bord to the main level above, a distance of 40 feet. They were within six feet of holing through, when they dismissed the boy who worked the fan by which the air of the place was kept pure, and going to the level above worked from the upper side. While so engaged some little gas must have collected in the place below; for on a bore hole being put through and a light applied to the hole, gas fired and Henry Devine, who had gone round and was in the place below got slightly burned.

The fifth case occurred at the Sydney Mines, also in a heading, on the 22nd of July. Donald Lammond and his partner when driving a heading to the rise struck a "roll" or "swelly" in the roof and with it a small blower of gas. Instead of informing the deputy, they went on filling several tubs of coal and thought little of the gas until it began to accumulate at the face. Then proceeding to brush it out with their jackets it ignited at Lammond's lamp, and burnt him about the neck and arms.

The sixth explosion of gas happened at the Vale Colliery, on the 7th of August, by which two Frenchmen were slightly burnt about the face. They went into a place where they had no business to be and where "danger" boards were up. This and other warnings not being sufficient to bring home to the

body of the men the necessity of complying with the rules of the colliery, the manager wisely prosecuted two other men who subsequently exposed themselves under somewhat similar conditions, and they were fined by the magistrate.

The seventh case occurred at the Acadia colliery on the 3rd of September. A French miner, named Casimer Martin, who had lately been working in the pit, but was then employed elsewhere, entered the pit without permission, to the knowledge of the deputy in charge, to look for some missing tools. He went into a short heading which had been standing for a few days, the pit not then working, and with his naked light ignited some gas that had accumulated. He was rather badly burnt, and being alone he had some difficulty in making his way out. An action in the courts is now pending against him. The Mines Regulation Chapter only applying to workmen does not contemplate such a case, where a man, not at the time a workman, effects an entrance into a pit and exposes himself and others to danger. The action has been brought under some Dominion statute.

The last explosion reported happened at the Victoria colliery to John McJaggart, the fireman, whose duty was to inspect the places and see that all were safe before the workmen entered. On the 4th of December he neglected to take his safety lamp with him, confident from long immunity that no gas collected, but he found with his naked lamp sufficient to punish his negligence.

**EXPLOSIONS OF POWDER.**—Three accidents are reported to have happened from this cause in coal pits. One from a man returning too soon in front of a charge that he thought had misfired, another from the stemming of loose powder and the third from the fall of a lighted squib into a can of powder. The last shows the value of the rule which restricts the quantity of powder which shall be permitted to be kept at any one time in one place. The quantity yet allowed, 10 lbs., is quite sufficient in such a case of reckless handling to cause serious, if not fatal injuries.

One accident is reported to have occurred with dynamite in a gold mine. The miner, Edwards, who was injured, was reported to have been picking out the stemming from a hole that had missed fire (contrary to the General Rules and to his orders) and a small stone falling in he endeavored to break it with an iron scraper when the charge exploded. Luckily for him the force of the explosion was expended

shattering the rock, and he received no very serious injuries. Other and minor accidents were imputed to dynamite, but an enquiry in all cases showed that they were due, not to dynamite, but to the detonators, which should be carefully handled, as they are heavily charged with a highly explosive fulminate. They should always be carefully put away, and especially out of the way of children.

**EXPLOSION OF A STEAM-BOILER.**—On the 22d of November, about 1 A. M., one of the steam-boilers in the slope engine house, at the Blockhouse Colliery exploded, and severely scalded the fireman, who was the only person in the building at the time. The manager in reporting the accident states, that "the fireman allowed the water to get too low, and in the act of feeding the explosion took place." Accidents from this cause can only be prevented by the selection of careful men to act as enginemen and stokers, for the best of boilers are liable to explode under such circumstances. As a general practice throughout the Province there is not that care of steam-boilers that there should be. I have had not only to call attention to extra weights hung on the levers of *safety* valves to prevent them from blowing off steam at double the working pressure, but actually to threaten a prosecution under the Chapter, unless the evil was remedied, and the valves were made what they pretended to be, *safety* valves.

**FALLS OF COAL AND STONE.**—Three cases of serious injury resulting from falls of coal and stone, were reported. The first occurred at the Reserve pit, on the 23rd of April, and was due to the collier, who was injured, not taking sufficient care when picking down a fall of coal that a shot had failed to dislodge.

The second happened to a collier at the Gardiner pit from the fall of a "caldron bottom," from the roof. Several fatal accidents have been occasioned by falls of stone from such pot holes, as they are not readily distinguishable; and a roof subject to contain them requires more than ordinary watching.

The third accident reported under this heading occurred at the Sydney Mines in October, and was precisely similar in character to the one noticed above as having taken place at the Reserve pit.

**ACCIDENTS IN SLOPES.**—On the 27th March, Henry Richart was seriously injured, at the Nova Scotia colliery, through his wilful disobedience of orders; and had his in-



piece at the shaft mouth. His injuries were severe but did not prove fatal, as from the character of the accident it was at first feared they would.

**MISCELLANEOUS.**—All the four fatalities that happened during the year have to be reported under this head. Two of which occurred in the gold mine at Montagu, worked on the Cross lead. On the 18th of February when the night shift were down a scaffolding on which was piled some ten feet of stone fell fifty feet to the next scaffold, thirty feet from the bottom, and carrying with it the lowest and new scaffold, crushed the two men Michael Carroll and John Kennedy who were working below. The mine had been let to tributers the previous autumn, and they had strengthened the timbering as they thought sufficient for their own safety. The mine had not been open for five years, and when I was in the district during the previous autumn it was then being retimbered, and the water being high prevented an entrance. It seems that when the mine was previously worked the scaffolds had not been fully stowed with the debris, so that when the upper one gave way it fell with great force and carried with it the two lower. As the lowest had been strengthened with new stull pieces it was thought secure; but the intersection of the two leads making the stope for about 30 feet in length, 8 feet wide, and the mine being vertical, the scaffold fell with great force. The cause of the giving way of the scaffold is not very evident. It was thought, however, that the previous steady and severe cold weather might have formed ice, and on a thaw occurring occasioned the fall. Whatever was the cause the accident shows the necessity of stowing the scaffolds full of the debris, that when the timbers decay, or from any cause give way, no severe shock may, by a movement above, be given to the timbers below. It is seldom possible to examine and strengthen abandoned scaffolds, except at great expense, and the precaution of stowing full should be especially taken in vertical mines.

The other two fatalities occurred on the surface at two of the collieries in Pictou County. The first happened on the 6th March, at the Nova Scotia colliery. Alexander Fraser was one of the banksmen, and his duty was to unhook the chain from the tubs at the head of the slope. On the day in question he had cast off the chain and stepped off the tub, and was standing with his back to the rake when his clothing was caught by the key of the cross bar of the third tub, and before he could disentangle himself he was carried





## LIST OF COAL LEASES IN THE PROVINCE.

No.	LESSEE.	COLLIERY.	Area Sq. Miles	WORKING.	AGENT AND Manager.	POSTAL ADDRESS.
1	McKinnon, et al.....	ANTICOST COUNTY.	3			
18, 14, 15	Black, C. H. M.....	CUMBERLAND COUNTY.	3			
21	Blight, James, et al.....		1			River Hebert.
11	Bradley, Benj.....		1		John Moffatt.....	
25	Campbell, Alex., et al.....		1			
32, 34	Campbell, Alex., et al.....		2			
35	Campbell, Alex.....		1			
81, 33	Campbell, John.....		2			
12	Cumberland C. M. Co.....		4			
17	Donville, James.....		3		E. N. Sharp.....	St. John, N. B.
	General Mining Association.....		4		John Rutherford.....	Halifax.
	Joggins C. M. Association....	Joggins.....	2	working.	{ B. B. Barnhill.....	Joggins.
	Joggins C. M. Co.....	Cumberland.....	2	working.	{ Robert Redpath.....	Joggins.
20	Kirby, Lewis R.....		1		Alex. Barnhill.....	Joggins.
18, 19	Livesey, John.....		2			
5	Lawson C. M. Association.....	Maccan.....	1	working.	William Bennett.....	Maccan.
1, 2, 3, 4	New York & Acadia Co.....	Scotia.....	4			
16	Seaman Gilbert.....		1			
24	Shannon, S. L.....		1			
6, 7, 8	Spring Hill Mining Co.....	Spring Hill.....	2	working.	William Hall.....	Spring Hill.
22, 23, 28, 29, 30	Styles Mining Co. [Limited]..		3		J. S. Hickman.....	Amherst.
9	Victoria Coal Mining Co.....		5			

# MINES REPORT.

	MANAGEMENT COMPANY.....	FRASER .....			working.	MANAGEMENT.....
3	"	Acadia .....	1	1	working.	
19, 21, 22	"	Pictou.....	4	4		
28	Allan, Sir Hugh, Kt.....	Vale .....	3	3	working.	{ J. B. Moore..... John Gresner .....
11	Haliburton, R. G. et al.....	.....	1	1		New Glasgow
	Halifax Company, (limited).....	Albion .....	4	4		{ S. Cunard & Co..... James Hudson.....
13, 14	Intercolonial Company.....	.....	2	2		Halifax. Stellarton.
12	"	Drummond .....	1	1	working.	James Simpson .....
6	Kirby, Lewis R.....	.....	1	1		Westville.
15, 30, 31	Merigomish Company.....	.....	3	3		
10	Montreal and Pictou Company..	.....	1	1		
25	Nova Scotia Company.....	Black Diamond.....	4	4	working.	W. W. White.. .....
20	Price, D. E., et al.....	.....	2	2		Westville.
24	Richey, M. H.....	.....	1	1		
			29			
		CAPE BARTON COUNTY.				
3	Archibald, Blowers.....	Gowrie.....	1	1	working.	{ Archibald & Co..... Charles Archibald.....
2	Archibald, Thos. D.....	" .....	1	1		North Sydney. Cow Bay, C. B.
5, 28	Blockhouse Mining Co.'y .....	Blockhouse .....	2	2	working.	{ W. Macquoen..... .....
						Cow Bay, C. B.

## LIST OF COAL LEASES IN THE PROVINCE.—(continued.)

72	Brookman, Samuel.....	.....	1	working.	David MacKeen.....	Little Glace Bay.
76, 77	" S, et al.....	.....	2			
15	Caledonia C. & B. Co.....	Caledonia.....	1			North Sydney.
31	( <i>sea area</i> ).....	.....	1			Sydney.
30	Campbell Alex.....	.....	3		T. D. Archibald.....	Port Caledonia.
23, 25, 70	Cape Breton Co. [Limited].....	Ontario.....	1½	working.	Edgar Stirling.....	Bridgeport.
8, 9	Clyde Coal Mining Co.....	Gardiner.....	2	working.	John Sutherland.....	Halifax.
66	Gardiner Coal Mining Co.....	Bridgeport.....	2		William Routledge.....	Sydney Mines.
	General Mining Association.....	Sydney.....	5	working.	John Rutherford.....	Halifax.
	" " ".....	".....	12		{ Richard H. Brown... }	Halifax.
	" " ".....	".....	3		{ Cunard & Morrow... }	Lingan.
27	" ( <i>sea area</i> ).....	Lingan.....	10	working.	Douald Lynk.....	
	" " ".....	".....	4			
38	( <i>sea area</i> ).....	.....	5			
39	( <i>sea area</i> ).....	.....	5			
4, 12, 16	Glace Bay Mining Co.....	Glace Bay.....	3	working.	{ E. P. Archibald... }	Halifax.
49	Glasgow & C.B.(N.S.)C. & R. Co.....	Reserve.....	1	working.	{ Henry Mitchell... }	Little Glace Bay.
75	Henry, W. A.....	.....	1		Edgar Stirling.....	Sydney.
22	Ingraham R. J. & J. L.....	Hallway.....	1			
6, 13, 18, 19	International C. & R. Co.....	International.....	4	working.	R. N. McDonald.....	Bridgeport.
71	Jennings Edward.....	.....	1			
47	LeCras & McInnes.....	.....	1			
64, 65	Lorway Coal Co.....	Lorway.....	2		Edgar Stirling.....	Sydney.
68	" " ".....	.....	1			
69	" " ".....	Emery.....	1	working.	Edgar Stirling.....	Sydney.
10, 21	Matheson J.....	.....	2			
74	Moore & Moseley.....	.....	1½			
81	Morton, Lemuel J.....	.....	1			



## LIST OF COAL LEASES IN THE PROVINCE.---(Continued.)

10	Tremain, E. D., (sea area).....		1			
			13			
		RICHMOND COUNTY.				
2	Marmaud, A. E. .... .	Little River.....	1			
		VICTORIA COUNTY.				
2	Cambell, Charles J.. ....	New Cambellton.....	3	working	John Macdonald.....	New Cambellton.
3, 4, 5	Ross, William .....	.. .. .	5			
			R			
Total area under lease.....			228½ square miles.			

## COAL TRADE BY COUNTIES.

TABLE A.

	CUMBERLAND.		PICTOL.		CAPE BRETON.		OTHER COUNTIES.		TOTAL.		1874.
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	
1st Quarter .....	12,097	10,298	80,612	17,961	55,438	3,534	.....	.....	148,147	31,788	35,052
2nd Quarter .....	13,530	12,335	90,692	76,467	87,090	71,173	1,521	1,446	192,833	161,421	190,149
3rd Quarter .....	17,606	17,452	124,186	102,780	111,555	146,629	1,888	1,293	255,235	328,154	346,688
4th Quarter .....	21,564	20,864	87,172	79,894	74,342	83,866	1,872	1,308	184,950	185,432	177,238
Total .....	64,797	60,944	382,662	337,102	328,425	304,702	5,281	4,047	781,165	706,795	749,127
1874 .....	51,580	49,599	410,876	357,926	404,268	337,016	5,996	4,586	872,720	749,127	749,127
1873 .....	27,592	26,345	383,949	333,984	639,085	520,189	841	588	1,051,467	881,106	881,106
1872 .....	15,750	14,152	492,716	388,417	437,326	380,274	5,158	3,070	880,950	785,914	785,914



## COAL SALES.

Markets.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year. 1875.	1874
Nova Scotia.....						
"    Land Sales.	18.824	10.046	7.823	21.025	57.718	61.6
"    Seaborne ...	2.356	37.812	72.458	42.286	154.912	153.3
Total.....	21.180	47.858	80.281	63.331	212.630	214.9
Quebec .....		48.549	116.526	24.679	189.754	162.2
New Brunswick....	8.561	19.081	29.642	28.684	85.968	78.8
Newfoundland .....	634	12.110	29.833	19.771	62.348	55.6
P. E. Island.....		8.822	23.086	11.733	43.641	41.9
United States.....	123	20.316	44.542	24.765	89.746	138.3
East Indies.....		1.003			1.003	
West Indies.....	1.290	1.228	3.151	10.760	16.429	47.8
South America.....		2.059	991	1.729	4,779	5.0
Great Britain.....		395	102		497	4.1
Total.....	31.788	161.421	328.154	185.432	706.795	749.1
1874.	35.052	190.149	346.688	177.238	749,127	749.1
1873.	38.231	188.392	414.434	240.049	881.106	881.1

## COAL.—GENERAL STATEMENT.

1875.	Produce.	Sales.	Colliery Consumption
1st Quarter.....Tons.	148.147	31.788	30,37
2nd " .....	192.833	161.421	30,00
3rd. " .....	255.235	328.154	31,37
4th " .....	184.950	185.432	32,35
Total.....1875	781.165	706.795	124.11
Total .....1874	872.720	749.127	119.58
Total.....1873	1.051.467	881.106	108.39
Total.....1872	880.950	785.914	101.34

NOTE.—Stocks on hand at the end of the year, 58,000 tons.



# COAL PRODUCE OF NOVA SCOTIA DURING THE YEAR ENDED DECEMBER 31st, 1875.

## MINES REPORT.

87

COLLIERIES.	MINE.	Produce.	Sales.		Per Centage.	Colliery Consumption		Per Centage.
			Bearing Royalty.	Free.		Engines.	Workmen.	
CUMBERLAND COUNTY.								
Cumberland,	Joggins,	336	180	....	53	120	....	..
Lawrence,		60	35	25	100	....	....	..
Neuman, (		528	132	396	98	....	....	..
Scotia,	North,	1400	1423	117	105	250	....	17
South Joggins,	Joggins,	11008	10867	731	97	900	182	0
Spring Hill.	Black,	50503	37383	5060	93	2346	1021	0
PICTOU COUNTY.								
Acadia,	Acadia,	66002	49824	12139	93	4370	1932	0
Albion Mines	Deep,	40943	98397	17191	84	17696	4650	16
Intercolonial,	Malin,	90121						
Mitchell & Co,	Acadia,	72016	54790	7462	86	2373	3124	14
Nova Scotia,	McBain,	214	200	84	109	....	....	..
Vale,	Acadia,	60824	39046	10432	82	5573	1768	12
	McBain,	40547	37494	9273	100	1388	1163	4
CAPE BRETON COUNTY.								
Blockhouse,	Blockhouse,	23004	21004	250	96	2400	1804	16
Caledonia,	Phelan,	16506	10478	2256	70	799	659	9
Collins,	Collins,	462	252	138	68	120	64	27
Emery,	Emery,	8356	6113	312	76	2720	621	40
Gardiner,	Lowry,	10409	10005	385	100	3380	572	29
Glace Bay,	Harbor,	22734	20955	712	113	707	983	7
Gowrie,	McAuley,	23024	2001	6743	130	2010	3041	23
Ingraham,	Indian,	150	150	....	100	....	....	..
International,	Harbor,	40480	41001	....	103	1130	1806	6
Lingan,	Lingan,	22800	22536	3117	114	3327	1605	23
Ontario,	Phelan,	5608	380	46	96	03	238	0
Reserve,	Phelan,	9413	10373	1479	123	1823	735	27
Schooner Pond,	Emery,	1116	1365	293	..	07	13	..
South Head,	Spencer,	2205	589	....	48	17	96	9
Sydney Mines,	Lloyd,	121904	92014	815	74	25605	7200	20
Victoria,	Malin,	18314	18321	879	73	2778	3080	25
INVERNESS COUNTY.								
Port Hood,	Ross,	720	315	..	43	180	38	30
VICTORIA COUNTY.								
New Campbellton,		4561	3732	..	81	558	160	15
		781,105	621,870	84,925	90	83,534	40,576	15

Through a screen, the bars of which are not wider apart than three-quarters of an inch. close of 1876, quantities returned for 15000 tons

NOTE - from the more the

Statement of the number and classes of persons employed, and average results in coal output, during the year ended December 31st, 1910.

COLLIERIES.	UNDERGROUND.				SURFACE.				Construction.		Total.		Ave. No. of days per person				Average quantity raised per day—Tons.	Horses.		Pits Worked.
	Cuts	Laborers.	Boys.	Days Labor	Mechanics.	Laborers.	Boys.	Days Labor	Men.	Days Labor	Per.	Days Labor	Unit.	Four faces.	Average of tons per (utter.	Average tons per day per (utter.		Above	Below	
Cumberland,	8			1039	4	6		2 984	9	916	20	2960	133	82	42		1		143	
Lawrence,	1	1		76						2	2	76	38		60				38	
Scotia,	6	2	1	1232	2	2	1	1177	3	85	17	2494	136	235	243	10	1		142	
South Joggins,	24	3	9	7386	8	7	2	5065	1	26	54	12477	34	208	496	65	6		182	
Spring Hill Mining Co.,	73	24	10	28862	19	38	4	13000	10	1797	178	46888	204	261	692	182	3	4	277	
Acadia,	95	27	20	31216	27	66	3	21692			240	33908	220	252	695	305	15	5	216	
Albion Mines,	273	62	60	83674	47	118	8	61388			607	14302	207	302	562	{ 10 252 } { Ms 417 }	22	32	{ 10 186 } { Ms 216 }	
Intercolumnial,	84	34	18	31686	29	40	15	25008	60	3255	298	64440	243	265	857	25	8	2	220	
Mitchell & Co.,	3	2	1	265		1		68			7	333	44	68	74	14		1	38	
Nova Scotia,	78	25	14	34411	13	39	7	17047			176	52188	297	304	740	230	5	5	243	
Vale,	124	28	11	33645	27	37	5	16205	15	1705	247	51555	206	234	375	219	3	5	212	
Block House,	45	5	20	9670	19	20	4	8933			113	18543	138	207	512	181	9	13	127	
Caledonia,	32	3	9	7034	12	19	3	5053			78	12987	100	175	517	149	10	7	111	
Collins,	6	9	1	1696		10	1	1361	5	151	32	3908	106	123	110	15	1		42	
Emery,	39	1	11	4897	13	13	3	4331			80	9228	96	150	214	177	5	5	47	
Gardiner,	41	2	7	3425	5	8	2	1632			69	5057	68	109	254	65	5	2	158	
Glace Bay,	42	5	19	11847	16	12	3	6980	14	1631	111	20458	179	225	541	118	11	14	192	
Gowrie,	60	10	18	15210	19	25	13	12252			145	27402	173	215	308	176	8	12	136	
Ingraham,	2		1	150	1			60	11	188	15	308	50	60	75		1		45	
International,	63	8	14	18443	13	23	3	12422	2	133	126	30308	216	318	643	213	10	12	190	
Langan,	49	8	14	14932	33	33	9	11644			113	26596	210	277	465	190	7	12	142	
McInnis & Le Crag,					4			230			4	230		57			1		30	
Ontario,	24		2	2921	3	15	2	2876			46	5797	112	143	235	39	2	2	145	
Reserve,	50	1	15	5019	13	10	5	4479			94	10398	90	160	190	182	8	11	52	
Schooner Pond,					7	13	1	418			21	418		20			1			
South Head,	19	8	4	384	2	2	2	335	17	1341	47	2260	203	56	112	26	1		43	
Sydney Mines,	221	55	100	88421	61	85		50293	91	25166	640	163780	235	291	562	{ Ms 493 } { Ls 15 }	25	68	{ Ms 247 } { Ls 151 }	
Victoria,	49	20	4	9656	10	18		7485			104	17141	132	341	384	110	2	1	171	
Port Hood,	6	3	2	1313	2	3		1280	5	700	25	3293	119	142	120	4	2		157	
New Cambellton	22	6	3	4247	6	9	4	2974	15	111	65	7332	130	150	297	31	4		144	

## COLLIERY CONSTRUCTION ACCOUNT..

COLLIERIES.		Shafts.	Slopes.	Adits.	Machin- ery.	Colliery Build'g.	Dwell- ings.	Surface Works.	Rail- ways.	Wharves.	Pros. pecting.	Total.
Cumberland, Lawrence	..	975 00	2120 00	..	3650 00	2200 00	500 00	250 00	1110 00	300 00	200 00	11305 00
Scotia	..	..	25 00	..	..	..	..	..	..	..	..	25 00
South Joggins	..	..	..	235 00	..	..	..	..	..	..	..	235 00
Spring Hill	..	..	562 00	..	1650 00	..	..	..	..	..	..	2212 00
..	..	..	..	3842 00	10500 00	990 00	2100 00	127 65	876 32	..	23 70	20764 67
Acadia, Albion Mines	..	..	..	..	3499 74	58 58	1241 35	27 30	..	..	..	4826 97
Intercolonial	..	..	..	..	259 67	1122 83	9381 48	*18072 89	..	..	..	28836 97
Nova Scotia	..	..	8573 44	1457 95	6083 89	8010 10	..	1828 16	441 37	..	..	26994 91
Vale	..	..	400 00	4545 00	..	690 00	..	5082 00	..	355 00	330 00	11402 00
..	..	633 00	..	..	12896 00	1700 00	..	..	470 00	904 00	..	16903 00
Cape Breton Co												
Black House.	..	..	..	183 06	..	..	56 97	240 17	..	..	..	480 20
Caledonia	..	..	403 61	66 83	1119 98	253 70	63 60	200 00	260 11	384 80	..	2792 63
Collins	..	..	78 60	267 23	500 00	..	..	..	..	..	..	845 83
Emery	..	..	..	..	..	..	..	..	..	..	..	..
Gardiner	..	..	..	..	..	..	..	..	..	..	..	..
Glace Bay	..	2015 98	..	..	..	..	651 62	..	..	..	..	2680 60
Gowrie	..	1792 00	..	709 00	..	200 00	250 00	..	..	..	..	2751 00
Israhah	..	..	..	..	..	..	..	..	..	..	..	..
International	..	..	141 38	274 28	200 00	..	..	..	..	..	..	675 66
Lingan	..	..	..	466 60	4822 00	..	..	..	..	..	..	5388 60
McLennan and LeGros	..	..	30 00	..	..	..	25 00	150 00	..	380 00	..	475 00
Ontario	..	..	111 63	135 20	990 00	27 50	..	..	..	..	..	1302 79
Reserve	..	..	..	145 63	250 00	..	..	..	..	..	..	597 26
Schooner Pond	..	..	..	..	..	..	..	..	..	..	..	..
South Head	..	..	27 30	33 80	72 25	60 20	205 27	..	77 82	3660 43	..	3136 77
Sydney Mines	..	..	..	..	..	..	24 87	1076 97	5503 11	420 44	..	16338 41
Victoria	..	..	..	..	..	..	..	..	..	406 00	..	400 00
Inverness Co.												
Port Hood,	..	..	1620 00	556 00	3190 00	100 00	2726 00	..	..	..	..	8752 00
Victoria Co.												
..	..	..	..	..	5747 68	487 00	..	100 00	70 00	182 00	..	6971 68
New Campbellton.												
..	..	10829 00	14153 16	20465 35	50758 83	16449 91	17339 16	22073 24	12800 23	9606 67	918 70	176983 95

\* 15926 31, New Coke Ovens.

# MINES REPORT.

	Great Britain 1874.	UNITED STATES, 1874-75.			Nova Scotia. 1874-5.
		Bituminous.	Anthracite	Total.	
Great Britain.....	.....	.....	.....	.....	1117
Russia.....	883435	.....	.....	.....	.....
Sweden.....	600270	.....	.....	.....	.....
Norway.....	319283	.....	.....	.....	.....
Denmark.....	662289	.....	.....	.....	.....
Germany.....	2056881	.....	.....	.....	.....
Holland.....	447442	.....	.....	.....	.....
Belgium.....	229195	.....	.....	.....	.....
Channel Islands.....	62399	.....	.....	.....	.....
France.....	2281409	.....	.....	.....	.....
Portugal, &c.....	229108	.....	10	10	.....
Spain, &c.....	544319	.....	.....	.....	700
Gibraltar.....	139071	.....	.....	.....	.....
Italy.....	909363	.....	.....	.....	383
Austrian Territories.....	84389	.....	.....	.....	.....
Malta.....	312194	.....	.....	.....	.....
Greece.....	79306	.....	.....	.....	.....
Turkey, &c.....	321870	.....	.....	.....	.....
Egypt.....	617578	.....	.....	.....	.....
Algeria, &c.....	30088	.....	.....	.....	.....
West Coast of Africa.....	76930	150	124	274	.....
British Possessions South Africa.....	47270	.....	.....	.....	.....
.....	11888	.....	.....	.....	.....

**EXPORTS OF COAL FROM GREAT BRITAIN, UNITED STATES AND NOVA SCOTIA. Continued.**

## MINES REPORT.

[illegible]

† This quantity does not include the Sales and Consumption in the United States, is computed at 45,000,000 tons, of which is computed at 112,450,000 tons. \*\* Valued at \$9,029,000.



## MISCELLANEOUS NOTES.

### PORT OF HALIFAX.

#### Exports of Minerals :—

	1874		1875
Coal.....	7615 tons	\$30963	1850 tons.....\$7336
Gypsum.....	330 "	594	880 " .....1628

#### Imports of Coal :—

	1874		1875.
United States.....	4494 tons		5119 tons.
Albertite.....	585 "		387 ? "
Coast wise.....	110418 "		123200 "

### PORT OF ST. JOHN'S.

#### Imports of Coal :—

	1873	1874	1875
United Kingdom.....	Tons, 7075	7732	10615
Nova Scotia.....	" 40220	29863	48645
United States.....	" 348	268	583

### THE DOMINION IMPORTED 1874-5.

#### COAL AND COKE.

#### From

	Tons.	\$
Great Britain.....	139300	551317
United States.....	512835	2524771
Newfoundland.....	110	330
	652545 tons.....	\$3076418

### THE PROVINCES OF THE DOMINION IMPORTED 1874-5.

	Great Britain. Tons.	United States. Tons.	Newfoundland. Tons.
Nova Scotia.....	1131	5548	
New Brunswick.....	7141	16546	
P. E. Island .....		54	
Quebec.....	131307	106332	110
Ontario.....	9	384169	
Manitoba.....	10	112	
British Columbia .....	2	74	

## GOLD.

## GENERAL ANNUAL SUMMARY.

YEAR.	Total ounces of Gold extracted.			Quartz Crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average earnings per man per day and year, at 300 working days, and \$18 per	
	Oz.	Dwt.	Gr.		Oz.	Dwt.	Gr.		A day.	A year.
1862	7,275			6,473	1	2	11	156,000	\$0 83	\$2
1863	14,001	14	17	17,002		16	11	273,624	92	2
1864	20,022	18	13	21,434		18	16	252,720	1 42	4
1865	25,454	4	8	24,423	1	0	20	212,966	2 15	6
1866	25,204	13	2	32,161		15	2	211,796	2 14	6
1867	27,314	11	11	31,386		17	9	218,894	2 24	6
1868	20,541	6	10	32,262		12	17	241,462	1 53	4
1869	17,868	0	19	35,147		10	4	210,938	1 52	4
1870	19,866	5	5	30,829		12	21	173,680	2 05	6
1871	19,227	7	4	30,791		12	11	162,994	2 12	6
1872	13,094	17	6	17,093		15	7	112,476	2 09	6
1873	11,852	7	19	17,708		13	9	93,470	2 28	6
1874	9,140	13	9	13,844		13	5	77,246	2 12	6
1875	11,208	14	19	14,810		15	4	91,698	2 20	6
Total.	242,072	14	22	325,363		14	21	2,489,964	1 75	\$5

## DISTRICT SUMMARIES.

## CARIBOU.

YEAR.	Total ounces of Gold extracted.			Stuff Crushed	Yield per Ton of 2000 lbs.			Total Days Labor.	Average yield per man per day in dw at \$0.90.	
									Dwts.	
1869	1,001	0	23	1,583		12	17	11,076	1.80	\$1 0
1870	613	11	2	755		16	6	6,500	1.88	1 0
1871	504	15	23	479	1	1	1	2,964	3.40	3 0
1872	209	15	0	368		11	9	2,184	1.92	1 7
1873	17	16	12	21		16	23	312	1.14	1 0
1874	368	10	23	333	1	2	3	4,651	1.58	1 4
1875	446	12	19	368	1	4	6	3,675	2.43	2 1



## WAVERLEY.

YEAR.	Total Ounces of Gold Extracted.			Stuff Crushed,	Yield Per Ton of 2000 lbs.		Total days Labor	Average yield per man per day in dwts @ \$0.90.	
	Oz.	Dwts.	Gr.		Oz.	Dwts. Gr.		Dwt.	\$
1862	1,507	0	0	3,741	8	1	46,800	66	59
1863	2,380	6	3	6,755	7	1	58,344	81	72
1864	6,410	4	22	9,238	13	23	88,244	1 44	1 29
1865	14,404	4	9	12,518	1	3 0	87,308	3 29	2 96
1866	8,612	17	11	16,750	10	6	98,800	1 74	1 56
1867	3,942	5	2	10,510	7	12	46,436	1 69	1 52
1868	2,387	8	22	6,372	7	11	36,972	1 26	1 13
1869	1,591	14	10	3,915	8	3	16,796	1 89	1 70
1870	811	3	21	2,619	6	4	13,546	1 19	1 07
1871	1,427	18	12	2,772	10	6	17,472	1 62	1 45
1872	1,047	17	0	1,761	11	21	12,766	1 64	1 47
1873	1,009	0	0	2,013	10	0	13,520	1 49	1 34
1874	1,553	12	15	1,682	18	11	12,541	2 47	2 22
1875	1,740	1	0	1,313	1	6 12	18,807	1 85	1 66

## TANGIER.

YEAR.	Total Ounces of Gold Extracted.			Stuff Crushed.	Yield per ton of 2000 lbs.		Total days Labor.	Average yield per man per day in dwts @ \$0.90.	
1862	865	0	0	707	1	4 11	39,000	44	39
1863	494	8	21	655		15 2	37,440	26	23
1864	607	7	8	698		18 10	16,380	74	66
1865	644	7	13	639	1	0 4	13,156	97	87
1866	296	5	21	791		7 11	9,074	65	58
1867	691	14	7	724		19 2	6,864	2 01	1 80
1868	921	8	9	725	1	4 7	11,700	1 57	1 35
1869	1,192	3	10	1,332		17 21	15,938	1 49	1 34
1870	1,814	2	10	2,732		13 6	29,328	1 23	1 11
1871	2,093	0	7	2,924		14 7	27,326	1 53	1 38
1872	829	8	15	1,622		10 5	10,426	1 59	1 43
1873	726	11	15	1,070		13 4	8,892	1 63	1 46
1874	419	7	5	706		11 21	5,092	1 64	1 47
1875	448	2	15	1,106		8 1	6,667	1 34	1 21



## MONTAGU.

YEAR.	Total Ounces of Gold Extracted.	Stuff Crushed.	Yield per ton of 2000 lbs.	Total days labor.	Average yield per man per day in dwts. @ \$0.90.	
	Oz. Dwt. Gr.	Tons.	Oz. Dwt. Gr.		Dwt.	\$
1863	366 14 16	140	2 16 2	38,688	18	16
1864	1,052 19 14	545	1 18 15	11,492	1 83	1 64
1865	902 12 23	615	1 9 8	12,376	1 45	1 30
1866	496 15 10	382	1 6 0	6,032	1 64	1 47
1867	436 15 16	244	1 15 11	7,826	1 11	99
1868	584 14 22	350	1 13 10	7,384	1 58	1 42
1869	805 13 14	572	1 8 3	8,944	1 80	1 62
1870	3,831 9 5	916	4 3 14	15,106	5 06	4 55
1871	3,152 8 15	848	3 14 8	15,938	3 95	3 55
1872	1,793 10 6	683	2 12 17	13,832	2 59	2 33
1873	1,440 3 9	679	2 2 9	10,972	3 62	2 35
1874	655 0 22	496	1 6 10	5,452	2 40	2 16
1875	287 18 17	72	3 19 23	2,526	2 27	2 05

## OLDHAM.

1862	51 0 0	84	12 3	4,368	23	24
1863	1,223 3 21	1,026	1 4 6	25,896	94	84
1864	1,750 5 12	2,238	15 11	37,934	94	84
1865	1,126 11 20	2,236	10 1	18,278	1 23	1 10
1866	956 12 30	966	19 19	11,362	1 68	1 51
1867	1,100 3 14	870	1 5 7	15,418	1 42	1 27
1868	719 0 4	1,012	14 4	8,008	1 79	1 61
1869	1,394 16 0	1,735	16 1	17,576	1 58	1 42
1870	2,051 15 3	2,644	15 12	20,254	2 02	1 81
1871	1,718 12 12	1,374	1 4 4	13,494	2 54	2 28
1872	1,014 11 10	793	1 5 14	8,580	2 36	2 12
1873	998 2 17	662	1 10 3	6,994	2 85	2 46
1874	665 8 11	527	1 5 6	3,420	3 86	3 27
1875	915 8 3	550	1 13 6	6,100	3 00	2 70

## RENFREW.

1862	308 8 0	171	1 15 10	10,920	56	50
1863	785 7 7	575	1 7 7	21,216	74	66
1864	1,172 6 5	1,229	19 1	12,220	1 91	1 71
1865	1,008 10 18	927	1 1 18	14,430	1 39	1 25
1866	6,423 15 11	6,003	1 1 9	38,142	3 36	3 02
1867	7,904 19 2	7,222	1 2 4	61,308	2 57	2 31
1868	3,373 14 9	5,994	11 6	39,598	1 70	1 53
1869	3,097 15 7	7,258	8 12	34,606	1 79	1 61
1870	1,171 18 11	3,243	7 2	11,310	2 07	1 86
1871	1,179 17 16	2,463	9 4	10,972	2 15	1 93
1872	323 3 8	855	7 13	5,668	1 14	1 02
1873	59 16 18	255	4 16	2,028	59	53
1874	3 3 7	10	6 7	190	33	29
1875	47 16 6	113	8 11	690	1 38	1 24

## SHERBROOKE.

Y <sup>EAR</sup> .	Total ounces of Gold extracted.			Stuff Crushed.	Yield per ton of 2000 lbs.			Total Days Labour.	Average yield man per day in @ \$0.90.	
	oz.	dwt.	gr.	Tons.	oz.	dwt.	gr.		dwt.	\$
1862	2023	0	0	663	3	1	0	22464	1 80	\$1
1863	3304	14	12	3454		19	8	31200	2 11	1
1864	3419	14	20	2673	1	6	8	32630	2 09	1
1865	3424	1	21	2511	1	7	6	23010	2 97	2
1866	5829	13	8	2853	2	0	20	22490	5 18	4
1867	9463	18	0	7378	1	5	15	35958	5 31	4
1868	7070	0	5	9880		14	7	59540	2 37	2
1869	5546	11	16	11500		9	15	41964	2 64	2
1870	7134	4	0	11428		12	11	48880	2 91	2
1871	6579	19	7	13882		9	9	50856	2 58	2
1872	4188	9	21	5243		15	17	38246	2 21	1
1873	5026	0	4	7187		15	9	31460	3 19	2
1874	4037	1	2	5430		14	20	31199	2 58	2
1875	5818	15	10	6443		18	1	38683	3 00	2

## STORMONT.

1862	397	0	0	197	2	0	7	12792	62	
1863	1587	13	12	526	3	0	7	15600	2 03	1
1864	1510	4	21	636	2	7	11	25844	1 16	1
1865	1696	6	2	1040	1	12	14	25350	1 29	1
1866	1254	17	9	2253		11	2	11208	2 23	2
1867	1266	16	15	782	1	11	3	12428	2 03	1
1868	673	2	17	596	1	2	14	14560	92	
1869	227	0	13	590		7	16	6110	74	
1870	578	5	15	1525		7	13	6552	1 76	1
1871	559	7	21	1937		5	18	5590	2 00	1
1872	472	0	11	543		17	9	4316	2 18	1
1873	37	18	5	181		4	4	832	91	
1874	167	19	20	236		14	5	1799	1 86	1
1875	267	6	18	620		8	14	2543	2 10	1

## GOLD.

## GENERAL STATEMENT FOR THE YEAR 1875.

*Shewing the number of Mines at work, days labour performed, quantities of Quartz, &c crushed, yield of Gold, &c., &c. for the twelve months ended December, 31st.*

DISTRICTS.	Number of Mines.	Days Labour.	Mills Employed.	Steam Power.	Water Power.	Total No. of Stamps working one day.	Quartz, &c. Crushed.	Yield per ton.			Maximum yield per ton.			Total yield of Gold.			Average yield per man per day, for twelve months at \$18.00 per oz.
								oz.	dwt.	gr.	oz.	dwt.	gr.	oz.	dwt.	grs.	
Caribou.....	12	3675	1	1	1	.....	368	1	4	6	1	16	11	446	12	19	\$2 18
Gays River.....	1	1981	1	1	1	.....	2090	.....	2	9	.....	5	15	250	18	1	2 27
Montagu.....	3	2526	2	2	.....	.....	72	3	19	23	18	9	6	287	18	17	2 05
Oldham.....	9	6100	2	.....	2	.....	550	1	13	6	8	6	3	915	8	3	2 70
Renfrew.....	3	690	1	.....	1	.....	113	.....	8	11	1	5	17	47	16	6	1 24
Sherbrooke.....	9	38683	3	2	1	6460	6443	.....	18	1	11	.....	.....	5818	15	10	2 70
Stormont.....	2	2543	1	.....	1	.....	620	.....	8	14	29	.....	.....	267	6	18	1 89
Tangier.....	3	6667	2	1	1	.....	1106	.....	8	1	.....	19	13	448	2	15	1 21
Uniacke.....	2	2643	1	1	.....	.....	319	.....	8	17	3	17	12	139	3	3	0 94
Waverley.....	3	18807	2	1	1	.....	1313	1	6	14	2	14	10	1740	1	.....	1 66
Wine Harbor.....	3	3942	1	1	.....	.....	1140	.....	8	15	2	3	.....	492	11	22	2 24
Unproclaimed, &c...	2	3441	3	2	1	.....	676	.....	10	11	.....	19	22	354	.....	1	1 82
	42	91698	20	12	8	.....	14810	.....	15	4	29	.....	.....	11208	14	19	2 20

222222

## MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

MONTH.	CARIBOU.							GAY'S RIVER.							MONTAGU.						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dvts.	Grs.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dvts.	Grs.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dvts.	Grs.
January .....	2	632	24	112	115	13	16	1	259	10	280	19	17	.....	2	258	10	10	11	9	.....
February .....	1	140	5	43	78	8	.....	1	260	10	250	17	11	11	2	265	10	.....	.....	.....	.....
March.....	1	475	18	.....	.....	.....	.....	1	297	11	240	30	7	18	3	326	12	16	90	17	21
April .....	2	642	25	72	88	12	1	1	154	6	240	25	17	.....	2	187	7	2	24	4	.....
May .....	1	630	24	.....	.....	.....	.....	1	150	6	240	19	3	.....	2	158	6	4	34	3	2
June .....	1	616	24	78	80	5	.....	1	156	6	230	20	14	.....	2	155	6	6	30	1	.....
July .....	2	455	16	54	77	14	2	1	201	8	230	26	17	.....	3	183	7	2	4	17	.....
August .....	2	85	3	9	6	.....	.....	1	136	5	200	26	9	.....	4	187	7	4	20	8	.....
September.....	.....	.....	.....	.....	.....	.....	.....	1	90	4	180	50	17	.....	3	200	8	6	21	3	.....
October.....	.....	.....	.....	.....	.....	.....	.....	1	71	3	.....	4	4	5	2	157	6	.....	.....	.....	.....
November.....	.....	.....	.....	.....	.....	.....	.....	1	207	8	.....	9	0	15	2	206	8	6	22	19	18
December .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	244	9	16	27	16	.....
	2	3675	.....	368	446	12	19	1	1981	.....	2090	250	18	1	3	2526	.....	72	287	18	17

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(Continued.)

MONTH.	OLDHAM.						RENFREW.						SHERBROOKE.								
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Gr.
January .....	4	300	11	11	38	12	5								9	3130	120	399	373	6	....
February .....															9	3074	118	693	653	19	.....
March .....															9	3429	132	522	488	10	12
April .....															8	3484	134	459	431	12	....
May .....	12	500	19	39	79	10	19	4	30	1					8	3458	133	1009	731	11	.....
June .....	12	600	23	80	125	7	21	5	75	3	19	14	14	....	9	3510	135	628	510	14	.....
July .....	10	700	27	82	123	13	19	4	30	1	6	3	....	....	12	3588	138	522	510	6	.....
August .....	10	700	23	46*	108	3	4	4	75	3	25	7	....	....	12	3640	140	708	606	6	.....
September .....	12	700	27	45	79	10	15	3	120	5	40	6	3	12	6	2080	80	96	155	15	.....
October .....	12	900	33	62	142	14	16	3	120	5	3	1	15	18	10	3146	121	520	656	4	.....
November .....	12	900	33	107	124	12	2	3	120	5	.....	.....	.....	.....	9	3120	120	482	399	16	.....
December .....	18	800	31	78	93	2	22	3	120	5	20	15	3	....	10	3024	116	405	295	15	22
	11	6100	...	550	915	8	3	3	3690	...	113	47	16	6	9	38683	.....	6443	5818	15	10

\* 7 oz. from 20 tons tailings.

+56 oz. from plates.]

## MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

MONTH.	CARIBOU.							GAY'S RIVER.							MONTAGU.						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dpts.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dpts.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dpts.	Gr.
January .....	2	632	24	112	115	13	16	1	259	10	280	19	17	.....	2	258	10	10	11	9	.....
February .....	1	140	5	43	78	8	.....	1	260	10	250	17	11	11	2	265	10	.....	.....	.....	.....
March .....	1	475	18	.....	.....	.....	.....	1	297	11	240	30	7	18	3	326	12	16	90	17	21
April .....	2	642	25	72	88	12	1	1	154	6	240	25	17	.....	2	187	7	2	24	4	.....
May .....	1	630	24	.....	.....	.....	.....	1	150	6	240	19	3	.....	2	158	6	4	34	3	2
June .....	1	616	24	78	80	5	.....	1	156	6	230	20	14	.....	2	155	6	6	30	1	.....
July .....	2	455	16	54	77	14	2	1	201	8	230	26	17	.....	3	183	7	2	4	17	.....
August .....	2	85	3	9	6	.....	.....	1	136	5	200	26	9	.....	4	187	7	4	20	8	.....
September .....	.....	.....	.....	.....	.....	.....	.....	1	90	4	180	50	17	.....	3	200	8	6	21	3	.....
October .....	.....	.....	.....	.....	.....	.....	.....	1	71	3	.....	4	4	5	2	157	6	.....	.....	.....	.....
November .....	.....	.....	.....	.....	.....	.....	.....	1	207	8	.....	9	0	15	2	206	8	6	22	19	18
December .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	244	9	16	27	16	.....
	2	3675	.....	368	446	12	19	1	1981	.....	2090	250	18	1	3	2526	.....	72	287	18	17



## MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(Continued.)

MONTH.	OLDHAM.						RENFREW.						SHERBROOKE.					
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Gr.
January .....	4	30011	11	38	12	5							9	3130	120	399	373	6
February .....													9	3074	118	693	653	19
March .....													9	3429	132	522	488	10
April .....													8	3484	134	459	431	12
May .....	12	50019	39	79	10	19	4	30	1				8	3458	133	1009	731	11
June .....	12	60023	80	125	7	21	5	75	3	19	14	14	9	3510	135	628	510	14
July .....	10	70027	82	123	13	19	4	30	1	6	3		12	3588	138	522	510	6
August .....	10	70023	46	108	3	4	4	75	3	25	7		12	3640	140	708	606	6
September .....	12	70027	45	79	10	15	3	120	5	40	6	3	6	2080	80	96	155	15
October .....	12	90033	62	142	14	16	3	120	5	3	1	15	10	3146	121	520	656	4
November .....	12	90033	107	124	12	2	3	120	5				9	3120	120	482	399	16
December .....	18	80031	78	93	2	22	3	120	5	20	15	3	10	3024	116	405	295	22
	11	6100	550	915	8	3	3	690	113	47	16	6	9	38683	.....	6443	5818	15
																		10

\* 7 oz. from 20 tons tailings.

+ 56 oz. from plates.]



## MONTHLY STATEMENT FROM EACH GOLD DISTRICT. (Continued.)

MONTH.	STORMONT.							TANGIER.							UNIACKA.						
	No. Mines.	Days Labour	Men.	Tons.	Ozs.	Dwts.	Gr.	No. Mines.	Days Labour	Men.	Tons.	Ozs.	Dwts.	Gr.	No. Mines.	Days Labour	Men.	Tons.	Ozs.	Dwts.	Gr.
January.....	1	150	6	...	...	...	..	2	354	14	50	14	5	..	1	100	4	...	...	...	..
February.....	1	300	11	...	...	...	...	2	629	24	...	...	...	...	1	100	4	...	...	...	..
March.....	1	260	10	...	...	...	...	2	340	13	100	27	7	12	3	285	11	22	17	13	20
April.....	2	256	10	...	...	...	...	4	529	20	277	102	3	15	1	174	7	1	3	3	...
May.....	2	250	10	253	204	16	..	2	258	10	248	82	5	..	1	320	12	7	10	12	...
June....	2	180	7	...	...	...	...	3	571	22	122	92	9	..	1	162	6	...	...	...	...
July.....	3	196	8	50	2	...	18	3	581	22	49	33	10	...	1	20	1	15	26	17	21
August.....	3	180	7	152	26	12	5	3	543	21	80	42	8	...	2	300	11	...	...	...	...
September.....	2	192	7	...	...	...	...	3	692	27	51	16	13	...	2	380	15	43	29	12	12
October.....	3	198	8	...	...	...	...	3	553	21	35	17	7	12	2	175	7	92	23	10	22
November.....	3	230	9	165	32	18	19	3	763	29	30	9	4	...	2	327	13	64	13	16	...
December.....	3	151	6	...	...	...	...	3	854	26	64	10	10	...	2	300	12	75	13	17	...
	2	2543	620	267	6	18	18	3	6667	1106	448	2	15	2	2	2643	319	139	3	3	3

# MINES REPORT.

## Mines Department for 12 months, ended December 31st, 1875.

RECEIPTS.				EXPENDITURE.			
DISTRICTS.	Rents.	Royalty.	Totals.	Return of Rents.	Royalty Commission.	Salaries, Surveyors.	Totals.
Caribou.....	\$ 10.00	196.56	206.56	.....	13.55	.....	\$ 13.55
Fifteen Mile Stream.....	16.00	78.67	94.67	.....	3.84	.....	3.84
Gay's River.....	40.00	104.21	144.21	.....	4.78	.....	4.78
Montagu.....	8.00	108.41	116.41	8.00	5.29	4.00	17.29
Oldham.....	108.00	396.54	504.54	14.00	19.96	226.50	260.46
Ovens.....	18.00	.....	18.00	.....	.....	.....	.....
Renfrew.....	298.00	7.92	305.92	.....	.....	102.00	102.00
Sherbrooke.....	148.00	2196.37	2344.37	.....	106.99	746.32	853.31
Stormont.....	48.00	100.06	148.06	.....	7.18	310.13	317.31
Tangier.....	70.00	39.88	109.88	.....	.....	.....	.....
Uniacke.....	42.00	33.42	75.42	20.00	1.66	.....	21.66
Unproclaimed.....	6.00	3.38	9.38	.....	.....	.....	.....
Waverley.....	14.00	637.76	651.76	.....	38.21	.....	38.21
Wine Harbour.....	30.00	134.74	164.74	.....	6.12	475.50	481.62
Prospecting Licences.....	.....	.....	164.87	.....	.....	.....	6.00
	\$856.00	4037.92	\$5058.79	\$42.00	207.58	1864.45	\$2120.03

## OTHER THAN GOLD.

Mines Department for 12 Months ended December 31st, 1875.

COUNTIES.	RECEIPTS.				EXPENDITURE.			
	Licenses to search.	Licenses to work.	Royalty.	TOTALS.	Return licenses to search.	Return licenses to work.	Surveys.	TOTALS.
Antigonish	\$300 00	50 00	.....	350 00	.....	.....	.....	.....
Annapolis	20 00	.....	.....	20 00	.....	.....	.....	.....
Cape Breton	760 00	800 00	22922 17	24482 17	77 87	247 93	.....	325 80
Colchester	400 00	50 00	.....	450 00	20 00	.....	.....	20 00
Cumberland	660 00	575 00	3407 68	4642 68	20 00	.....	200 00	220 00
Guysborough	140 00	.....	.....	140 00	20 00	.....	.....	20 00
Hants	20 00	50 00	.....	70 00	.....	.....	.....	.....
Inverness	340 00	150 00	.....	490 00	20 00	.....	.....	20 00
Lunenburg	20 00	.....	.....	20 00	.....	.....	.....	.....
Pictou	420 00	300 00	24510 07	25230 07	40 00	.....	.....	40 00
Richmond	260 00	.....	.....	260 00	20 00	.....	.....	20 00
Victoria	140 00	50 00	540 00	730 00	.....	.....	.....	.....
	\$3480 00	\$2025 00	\$51379 92	\$56884 92	\$217 87	\$247 93	\$200 00	\$665 80

## ABSTRACT ACCOUNT.

RECEIPTS and EXPENDITURE for the Twelve Months, ended 31st December, 1875.

RECEIPTS.		EXPENDITURE.	
Licenses to Search Coal.....	\$3480 00	Return Licenses to Search Coal.....	\$ 217 87
" " Work .....	2025 00	" " Work .....	247 93
Royalty .....	51,379 92	Surveys .....	200 00
	<u>56,884 92</u>		<u>665 80</u>
Rents .....	856 00	Return Rents, Gold.....	42 00
Royalty.....	4,037 92	" Prospecting Licenses .....	6 00
Prospecting Licenses .....	164 87	Royalty Commission .....	207 58
	<u>5058 79</u>	Salaries and Surveys .....	1864 45
			<u>2120 03</u>
		General Expenses.....	5502 46
		Postage.....	66 04
		Stationery and Printing.....	1028 77
			<u>6597 27</u>
			<u>\$9383 10</u>
	<u>\$61,943 71</u>		

238743

# REPORT

OF THE

★  
DEPARTMENT OF MINES,

NOVA SCOTIA,

FOR THE YEAR 1876.

---



HALIFAX, N. S.:

PRINTED BY THE NOVA SCOTIA PRINTING COMPANY,

1877.

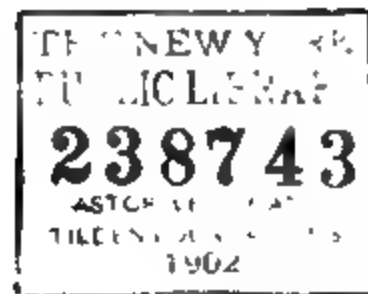




REPORT  
OF THE  
DEPARTMENT OF MINES,  
NOVA SCOTIA,  
FOR THE YEAR 1876.



HALIFAX, N. S.:  
PRINTED BY THE NOVA SCOTIA PRINTING COMPANY,  
1877.



# CONTENTS.

---

	Page.
General Summary of the Mineral Produce.....	7
Royalties, Precedents, Title, &c.....	9
Unworked Leased Areas.....	16
Spontaneous Combustion of Coal.....	17
Explosions of Gas and Blown-out Shots.....	20
Explosions of Gas and Influence of Coal Dust.....	22
Acadia Powder Company.....	24
Coke.....	26
Coal Trade.....	24
Diamond Drill Experience.....	26
Utilization of Waste Coal.....	27
COAL MINING,—Cumberland County.....	28
Pictou.....	30
Cape Breton.....	33
Other Counties.....	37
Colliery Machinery.....	39
Colliery Machinery Tables, Ventilation, &c.....	89
GOLD MINING.....	41
Treatment of Gold-bearing Ores in California.....	43
Gold Districts.....	50
Iron.....	57
Iron Ore Analyses.....	59
Lead.....	61
Copper.....	62
Freestone.....	64
Gypsum.....	65
Barytes, Hydraulic Cement.....	67
Marble Mountain Quarries.....	67
ACCIDENTS.....	68
List of Mineral Leases other than Coal.....	73
" " Coal Leases and Leases.....	74
TABLES.—COAL.—Trade by Counties.....	79
General Statement.....	81
Colliery Production.....	82
" Labor, &c.....	83
" Construction Account.....	84
Intercolonial R. R. Trade.....	85
Miscellaneous Notes.....	86
Total Production 1785 to 1876.....	87
United States and Canada.....	88
GOLD.—General Statement 1876.....	92
District Statements, 1876.....	94
General Annual Summary.....	96
District Annual Summaries, 1862 to 1876.....	98
Financial Statement.....	102



# DEPARTMENT OF MINES.

---

## REPORT FOR THE YEAR 1876.

---

*To His Honor the Honorable ADAMS GEORGE ARCHIBALD, C. M. G.,  
Lieut. Governor of Nova Scotia, &c., &c., &c.*

MAY IT PLEASE YOUR HONOR:—

The undersigned herewith begs to present to Your Honor the annual report of the Inspector of Mines, together with statistical information, compiled from official and other returns made to the Department of Mines, for the year 1876.

ROBERT ROBERTSON,  
*Commissioner of Public Works and Mines.*

Halifax, February 6th, 1876.



# REPORT

## ON THE

### INSPECTION OF MINES IN NOVA SCOTIA,

*[For the Year ended 31st December, 1876.]*

BY HENRY S. POOLE, F.G.S., ASSOCIATE OF THE ROYAL SCHOOL  
OF MINES, &C.

HALIFAX, February 1877.

SIR,—I have the honor to submit the following annual report on the mining operations in this Province during the past year.

The present condition of the several industries mentioned as compared with those of former years is shown in the following

#### GENERAL SUMMARY :

MINERALS.	QUANTITIES.			
	1873	1874	1875	1876
Coal.....tons.	1,051,467	872,720	781,165	709,646
Gold*.....ounces.	11,852	9,141	11,208	12,039
Iron Ore.....tons.	3,485	2,469	4,467	15,274
Manganese....."	181	.....	7	16
Copper....."	.....	.....	.....	45
Lead....."	.....	.....	.....	6
Gypsum....."	120,693	104,140	95,159	80,920
Freestone, &c....."	2,820	8,829	5,778	5,905
Limestone....."	.....	448	4,860	1,094
Moulding Sand....."	130	300	100	227
Barytes....."	.....	208	175	.....

\* Unsmelted Gold valued for Royalty at \$18 per ounce. The average real value of smelted Nova Scotia gold is high, \$19.22 per ounce.

## MINES REPORT.

---

Under their respective headings the several minerals wrought are separately referred to, and some matters more especially relating to them are at the same time briefly considered.

**COAL.**—It will be seen that there has been no renewal of activity, but on the contrary, a further decline in the chief industry, the coal trade; a falling off to the amount of 71,519 tons having occurred within the year. The total produce 709,646 tons, being only 67 per cent. of that of 1873. With respect to the anticipated export trade of the current year, it is much to be regretted that the present indications do not point to much, if any, increase. The details of the trade and the destinations of the exports will be found as usual in the appendices. References to pit-workings and to colliery practice and to matters of more special interest to miners are touched on in other parts of this report.

**GOLD.**—The comparative steadiness of the yield from the Gold Mines of late years holds out hopes that future annual statements will show no further decline and possibly a slow increase.

**IRON.**—The completion of the Blast Furnaces at Londonderry and the erection of a rolling mill by the Steel Company of Canada in addition to their other works promise to enrol Nova Scotia Iron among the competing brands for the trade of the Dominion, and to raise iron-mining to its proper position, second on the list of mining industries. Late discoveries of iron-ore, and further reference to the works at Londonderry will be subsequently mentioned in due course.

**COPPER.**—Touching here only on the salient points connected with the development of each industry, it will suffice to remark respecting copper that further explorations in Antigonish county confirm more and more the anticipations suggested long ago by surface indications that copper ore exists in workable quantities in the district of country about Lochaber. Hopes may now be reasonably entertained that copper mining and copper smelting will before long rank among the permanent industries of this Province; especially if the much needed facilities for transit are supplied by an advantageous proximity of the Eastern Extension Railway.

**LEAD.**—The hopes which the discovery of a vein of galena at Medonias suggested last year have not as yet been confirmed by the explorations. The work of prospecting has, however, not been abandoned and a workable vein may yet be found in the district. Of the ore taken out 5 tons were shipped to England for sale.

**MANGANESE.**—The Ores of Manganese found at several points along the shore of the Basin of Minas are of well-known purity and the high price which such ores now command should induce further explorations for extensions of the deposits. Since the discovery of Manganese at Teny Cape some 5000 tons have been mined.

**NON-METALLIC MINERALS.**—The quantities of Gypsum, Freestone, etc., given in the general summary as shipped from Nova Scotia are compiled from statements most courteously supplied direct from the Collectors of Customs at the several shipping ports. The figures given do not include quantities quarried for local consumption and some of the shipments to ports in Canada. To ports on the St. Lawrence perhaps as much as 5,000 tons of Gypsum were shipped—chiefly from the Great Bras d'Or, C. B. To Prince Edward Island, Ca



Breton doubtless sent as usual over 4,000 tons of Limestone, but no accurate account could be obtained as the closing of the St. Peter's Canal for repairs turned the trade from the Bras d'Or to Lennox Passage and other outside places where Limestone is quarried.

MATTERS OF GENERAL INTEREST similar in purport to such as are added to this report were inserted in previous ones and accepted as not entirely foreign to the object of these annual reports. The chief object of which is, it may be said, to record and to disseminate information concerning past mining operations in the Province. But as they fall into the hands of many who have few if any other means of knowing what is done elsewhere than in the Province these brief references to extraneous matters are inserted for their information. Moreover there is reason to believe that the references already given to outside practice, and to the introduction of modifications have not been without influence in inducing further trials and improvements at other establishments.

ROYALTIES.—A general impression has become prevalent in the Province that the royalties paid into the Provincial Treasury bear hardly on the mining industry. By frequent repetition this has become a fixed idea, and many think that the industry is by the imposition of royalties exceptionally taxed and disproportionately so to other industries of the country.

In accordance with your request I have collected, in the following article, data, which appear to show that, however much we may desire that every facility should be given to aid the development of mining in Nova Scotia, it is evident that the imposition of royalty, or its equivalent, is all but universal and by no means exceptional here; and further, that our miners enjoy unusual facilities for searching for and working minerals. So that it would seem while for the purposes of revenue money is collected by means of royalties no irritation can be justly caused by regarding the royalties demanded as special taxes. Supposing for a moment it were agreed that the royalty, say on coal, should be remitted. The first question that would be asked would be to whom shall the mineral rights be given? Whether to the owner of the soil or to the individuals who have been lucky enough to obtain mineral leases from the public. Now the owner of the soil does not ask the public to give him the right to the subjacent minerals which were specially reserved in his grant of the surface, and why the public, which reserved the minerals to acquire a revenue by means of a royalty imposed on the proceeds of workings in lieu of a fixed sum per acre, should resign their rights to the mineral speculator is not very apparent.

Touching first on the claim of the landowner, the great legal authority, Sir Edward Coke, states "that the word *land* includes not only the face of the earth, but everything under it or over it. The owner of the soil would therefore be according to the above maxim entitled to the minerals beneath the soil, had not the Crown on taking possession of this country reserved these rights. But, writes Arundel Rodgers in "The Law of Mines, Minerals and Quarries" the title of the freeholder, or the lord of the manor in the cases of copyhold, commons and waste lands is capable of being rebutted or qualified by evidence showing distinct ownerships or rights in different persons; and in England it

not only frequently happens that the ownership in minerals is vested in one person, and the soil in another, but several distinct ownerships, and rights to different minerals under the same surface, and even of qualified interests to minerals, both when distinct and blended with the ownership of the soil, do exist. For instance, the Sovereign is entitled to all gold and silver, whether found in the demesnes of the Crown, in the highways, or in the lands of private persons, situate in England or Ireland. The Crown is also proprietor of the soil and of all the minerals beneath the soil in the Forest of Dean, subject to the right of the "free-miners" of that district to a grant from the Crown to work the minerals upon payment of a royalty; and in the parts of Derbyshire where the mining customs prevail Her Majesty in right of her Duchy of Lancaster, is the owner of the lead mines, whilst any of Her Majesty's "liege subjects" are entitled freely to enter upon and to work those mines without even the permission of the owner of the soil or of Her Majesty.

In Scotland the Crown has no right, not even to the precious metals, but only to a royalty payable out of the produce. The eldest son of the Sovereign has an indisputable title to all minerals under certain lands in Cornwall belonging to private persons. In the north of England one person is not unfrequently entitled to the coal, whilst another is entitled to the ironstone; one may be the owner of the seams of coal, whilst another may possess the seams of sandstone or other like substrata; and two or more seams of coal under the same lands may be sometimes vested in different proprietors.

These instances of distinct ownerships and rights are analogous to the civil law. Under the Roman Empire, all mines, minerals and quarries, and indeed the soil itself, belonged to the state by right of conquest. In some of the provinces on the allotment of land to private individuals the conquerors reserved the rights to the minerals for the benefit of the State. But there was no universal law, and variations were made in the laws of different provinces by successive emperors, as well for state purposes as for the advantage of private persons.

Gratian gave a general permission to take minerals from the lands of private persons on paying one-tenth to the state and another tenth to the owner. His decree was adopted by Valentinian and Theodosius Maximus.

The Emperor Valentinian published a rescript which allowed the state mines to be worked by private persons on payment of a royalty. The state retaining the right of preemption when the gold found exceeded a certain quantity. The royalty was called *canon metallicus* and was fixed at eight scruples in gold dust for each worker in the mine."

Merivale, in his History of the Roman Empire, writes, 'Over the treasures concealed beneath the soil, the state claimed the same paramount dominion as over the produce of its surface. The mines and quarries throughout Italy and the provinces were held in part by the Roman people, and farmed, like the land tax, to private speculators; in part conceded to private proprietors, with the reserve of a fixed rent for the privilege of working them.'

In Gamboa's Mining Ordinances in Spain it is stated that, 'By the civil law, all veins and mineral deposits of gold, silver and other

precious stones, belonging if in public ground, to the sovereign, if in private ground to the owner of the soil, subject to this condition in the latter case, that, if worked by the owner, he was bound to render a tenth part of the produce to the prince, as a right attached to his crown; and if worked by any other person, by consent of the owner, the former was liable to the payment of two-tenths, one-tenth to the prince and one-tenth to the owner.'

Germany is the country where it is supposed the Sovereigns first succeeded in establishing their pretensions to a royalty on mines.

The law for the Prussian States formerly imposed a duty of a tenth on the raw material and whether the mines were worked or not there was a small duty of one thaler per annum paid on the concession. Subsequently the duties were reduced; and a new decree in reference to all mines dated January, 1865, reduces the royalty to one per cent. There were also formerly innumerable taxes and commissions paid by the mines, to cover the costs of scientific and financial administration, all of which are now abolished, and instead thereof a regular tax of supervision, amounting to one per cent. of the value of the product, is levied on mines in actual operation only.

The ancient royal rights of the State of Austria extended to every kind of mineral, and the new law of May 22, 1854, confirms those rights. The sovereign is now entitled to a double duty, the one fixed depending upon the area of the mine, the other variable, being one-tenth of the raw product payable in money.

Spain—by a decree of Amadeo I., dated 24th July, 1871, concessions for working mineral substances were given in perpetuity, subject to an annual quit rent per hectare, fixed as follows:—For precious stones and metalliferous substances, iron excepted, ten piacetos (\$2) per hectare. Iron, combustible substances, &c., four piacetos (80c.). These latter, by a decree of the government in 1868, were subject to an annual quit rent of \$3 per hectare.

France.—By the Code Napoleon, each mine paid a certain fixed sum per annum, according to the size of its field, and also a tax of 5 per cent. on its net profits. To this amount one-tenth was added to cover incidentals. The net profit was ascertained by subtracting the current expenses only, not the cost of permanent improvements, from the total production. These taxes amounted in the aggregate to about 2 per cent. of the gross product; and since the 1st of January, 1865, they have been replaced by a single tax of that amount. It is, of course, much easier to collect a tax on gross receipts than on net profits, and the result is the same to the mines. (*Raymond Statistics 1869*).

Mexico.—Since 1822 there have been some modifications of the fiscal laws. The total amounts of the present duties are four and a half per cent. on silver, and three per cent. on gold.

Italy.—By the mining laws of 1859, Arts. 59-61, every concessionaire shall pay to the state a fixed tax and a proportional tax. The fixed tax shall be 50 centimes for every hectare (2½ acres) of land included in the concession, and must in no case be less than 20 lire (\$4). The proportional tax shall be five per cent. on the net produce of the minerals, and will be settled yearly by the governor of the province, on the report of the mining engineer. Art. 63, The govern-

ment may remit in whole, or in part, the proportional tax payable by the concessionaire, in case of heavy expenditure, extraordinary work, or on account of damage suffered from accident not imputable to negligence. Such remission must be by royal decree.

These references to the sovereign's right to minerals in Europe have been taken, and chiefly almost verbatim, from Rodgers book on the "Law of Mines, Minerals, and Quarries." But, in Nova Scotia, the Crown having taken possession of the country, claimed both the land and the minerals and having distinguished between them by reserving the latter in the grants of land to settlers, the rights of the Crown to the minerals here stand in a different relationship to what those of the sovereigns of Europe do to the miners of that Continent.

In many of the cases quoted, the royalty claimed became a special tax on the mining industry to the Crown, but the dues called royalty in Nova Scotia are more comparable to the dues also called royalty paid to the freeholder in England, and to those similarly named and paid to the land-owner in the United States.

Turning to the Statutes of the United States, it will be seen that by a resolution of the Senate and House of Representatives of the United States of America in Congress assembled, dated 30th January 1865, it was provided that no Act passed in the first session of the 38th Congress, granting lands to States or corporations, should be construed as to embrace mineral lands, which in all cases were declared to be reserved specially to the United States, unless otherwise specially provided.

A subsequent Act passed in the following year declares that mineral lands of the public domain, both surveyed and unsurveyed, are to be free and open to exploration and occupation by all citizens of the United States and those declaring their intention to become citizens, subject to such regulations as may be prescribed by law. A claimant to a mine on a vein may obtain a patent from the General Land Office, after complying with certain regulations, on payment of five dollars for each acre.

Coal lands are by the same ordinance regulated to be sold at twenty dollars per acre, when they are within fifteen miles of a completed railroad, and when they are beyond, at ten dollars per acre. An individual may enter any area not exceeding 160 acres. A partnership or association may enter any area not exceeding 320 acres. A partnership or association of more than four persons duly qualified, who shall have expended not less than \$5,000 in working and improving any coal mine, may enter on an area not exceeding six hundred and forty acres. The opening and improving of a coal mine in order to confer a preference right of the purchase, must not be considered as a mere matter of form; the labor expended and the improvements made must be such as to clearly indicate the good faith of the claimant. (See—The Revised Statutes of the United States relating to Mineral Lands and Mining Resources, by W. A. Skidmore.)

As to the actual sums paid as "royalty" to the owner of both land and minerals, Mr. P. W. Sheaffer, the well-known mining engineer at Pottsville, kindly informs me that in the Southern Anthracite field the royalty varying from 25c. to 50c. per gross ton mined and shipped to market is paid. The average being about 35c. From the be

collieries 50,000 tons is about the minimum quantity required to be annually mined. In cases where the coal lands are sold and no rights to royalties are reserved, the price varies from \$100 to \$1,000 per acre. On an average the price is \$500 per acre.

Mr. J. M. Williams, Inspector of Coal Mines in the Wyoming Region, has had the kindness to give me the result of his experience; and to state that the prices, rents and royalties depend so much on the thickness of the seams, the number of the seams, the thickness of the overlying strata, the conveniences for extraction and transportation, &c., &c., that they vary considerably; and that the selling price ranges from \$300 to \$1,200 per acre; the royalty varies from 12½c. to 30c. per ton, and on an average is 25c. per ton on all coals that have passed over screens of ½ths to ¾ths inch mesh. And that when the minimum output is not reached, an equivalent rent of from 40c. to \$1 per acre is exacted.

Mr. Andrew Roy, Inspector of Coal Mines for Ohio, has placed me under obligations to him for information respecting the bituminous coal fields of the West. He informs me that the price of coal land ranges from \$60 to \$500 per acre, and that the average selling price in Ohio is about \$150 per acre, in Indiana \$100 per acre, and in Illinois \$75 per acre. Little renting of coal lands is done west of Ohio; and when sold they are dearer in Illinois than in Iowa or Kentucky. In north-eastern Ohio, the royalty charged ranges from 25c. to 75c. per ton, and the coal lands sell from \$150 to \$500 per acre. In south-eastern Ohio the lands sell from \$50 to \$150 per acre, and the royalty ranges upwards from 6½c. per ton. The average in the State may be set down at 25c. per ton.

In the north of England, Bainbridge writes, rents and royalties vary from 5 to 14 per cent. of the value of the coal.

The toll tin rendered by the free-tinners of Cornwall to the lord of the soil was, until lately, one-fifteenth of the produce.

In the High Peak of Derbyshire, the duty paid to the Crown in right of the Duchy of Lancaster, is usually one-nineteenth part of the lead ore raised; though a full tenth is said to be due. The lord is also entitled to "cope" sixpence for every load of ore carried off the ground.

Mr. Warrington W. Smyth, H. M. Inspector of Crown Mines, and lecturer on mining at the Royal School of Mines, London, replying to an enquiry of mine on this subject, kindly wrote the following concise résumé:

"The royalties, as a rule, in Continental countries are very much lower than in the British Islands, being there almost universally connected with the idea of the minerals being the property of the nation and worked under restrictions, carried out by national officers, whether Imperial, Royal, or Republican, who have charge of the districts, ordering certain works, restricting dividends, &c. Prussia, and Germany generally, used to suffer under a great multitude of imposts, which, I believe, are merged in a royalty of 2 per cent on the gross produce. In France and Italy the royalty is taken upon the profits instead of the gross. In Great Britain it is usual, except with iron ores, to take a fractional part of the whole as royalty or dues payable to the owner of the mineral. You know that here there is no pro-

perly so-called royalty, i. e., sum paid to the government, except mines which happen to be in Crown lands. In the north, the portional dues have been from 1-5th (retained so high only in a few cases) to 1-7th, and to 1-10th the more frequent. In the south-west (Wales and Cornwall) 1-10th is the highest and is now unusual because of depth, water, &c. It is more commonly from 1-10th to 1-18th; and in the case of old and deep mines 1-18th to 1-30th is not uncommon. 1-15th may be looked upon as the highest limit in the westernmost counties, and this refers to all the metallic minerals.

"Where a money rate is placed as the due on iron ores, it is 4d. as in some poor stratified oolitic, &c., ores, to 6d. or 9d. on common ores, and to 2s. 6d. per ton on special and well-placed hæmatite. During the prosperity of two or three years ago, I heard of 3s. 6d. even 4s. 6d. per ton being offered to private owners as royalty on hæmatite in the Furness district.

"With coal, from 1-8th to 1-20th of the selling price is sometimes required, but there are many other ways of taking the royalty, as we probably know,—all sorts of rates, from 3d. up to 2s. 6d. per ton, or ways of paying per acre, or per foot thick per acre. \* \* \*

When leased mineral rents I have to deal with run from a few pence in unknown speculative cases to £2000 a year when the mineral is proved to be certain."

Dunn, in the "Winning and Working of Collieries," published many years ago, states that the royalties in the north of England then varied from 6d. to 12d. for round coal, and from 2d. to 4d. per ton of slack coal. And in Scotland and elsewhere, from one-twelfth to one-fifth of the value sold. Throughout Lancashire and the neighbouring counties the coal is let and sold by the Cheshire acre, which contains 10,240 square yards; the statute acre being 4,840. The rent is levied at so much per foot thick per acre, the said footage ranging from £40 to £140 per acre. The measurements are made half-yearly. By this system it is clearly to the advantage of the lessee to produce the greatest possible yield per acre. The available produce of ordinary mining may be stated at three-fourths of the gross contents.

The above mentioned rate would be equivalent to a royalty on the gross contents of from 3d. to 10d. per ton. Mr. Ashworth, of Burslem, informs me that now the rents in Lancashire vary on an average from £70 to £100 per foot thick of coal, per Cheshire acre. Varying about Burslem the rents vary from £30 to £40 per statute acre. Where coal and slack are paid for by the ton sold, the price averages 10d. for round coal and 5d. for slack.

Hislop, in his *Colliery Management*, 1876, treating of mining leases, after referring to *fixed rents on tonnage*, says a second mode of leasing coal is by *proportion*, or payment of fixed portion of the selling price. It is very equitable in principle, being lighter on the tenant in dull times, and only heavier when he is better able to bear it; but the trouble is to arrive at a fair value. A third mode is *lease by the acre*, as already referred to in the extract from Dunn's *Winning and Working of Collieries*.

The tributers at the gold mines of Nova Scotia recognize the equity of payment of royalty to private individuals holding leases from the Crown, for they agree with such lessees to "take a lay

5 per cent., or 10 per cent., or even 25 per cent. of the value of the gold product from leads of proved value, in preference to paying to the Department of Mines \$2 an acre and only 2 per cent of the product for unproved lands. The sums so paid to private individuals are as rightly called "royalty" as those paid by the direct mineral lessee into the Provincial Treasury.

Mr. Richard Brown, whose carefully compiled book on the Coal Fields and Coal Trade of Cape Breton will always be a standard authority on the early history of the trade, gives in detail the several leases issued by the Imperial Government to work the mines of Nova Scotia. On referring to his book it will be seen that in 1792 a lessee agreed to pay a royalty of 3s. per ton. In 1802 William Campbell paid 4s. a ton, and subsequent lessees in 1813 and 1821 paid a royalty of 3s. 8d and 3s. 6d. per ton. In the following year Messrs. Bown took a lease at 4s. 3d. per ton. In 1825 the grant of all the unreserved mines and minerals to the Duke of York was given, and in it the royalty was fixed at 1s. sterling per ton. The General Mining Association who obtained the rights of the Duke of York also, three years later, leased from the Local Government the reserved mines, and it was agreed by all the parties concerned that the royalty should be 2s. currency per Newcastle chaldron,—equal to 10d. per ton. The dues to the Duke of York under the sublease to the General Mining Association were at the rate of 8d. per ton. Then by a subsequent agreement between the Crown, the Local Government, the creditors of the Duke of York, and the Association, which need not be touched upon further here, in 1858 the present arrangement was affected.

Mr. Brown also states that when the country was a French colony Governor Denys obtained a concession in 1654 from Louis XIV. of the whole island of Cape Breton, with full powers to search for and work mines of gold, silver, copper and other minerals, paying to the king one-tenth of the profit. And further that M. Duchesneau, the Intendant of France in 1677 recognized and established Denys's right to exact a duty of twenty sous per ton from all persons taking coal from Cape Breton.

The Local Government of British Columbia retaining the same rights and privileges as the Crown retained in Nova Scotia, have leased some coal mines at a royalty of 10 cents per ton; but they also require in addition an annual rent of \$100 which of itself is a very nominal sum for a company working a lease to pay. It is however, sufficient to check monopolists from taking out leases of large areas and holding them at no expense (as is done here) against a possible rise in value of coal lands and a making an advantageous sale. It is to be regretted that a similar annual rent is not required from lessees in this province that bona-fide miners might be separated from monopolists. At present the only anxiety that the latter have concerns the royalty after 1886. For the uncertainty of the future rate as the time approaches militates more and more against their prospects of a sale.

Had the Crown granted its rights to the minerals in Nova Scotia to the owner of the soil, companies and individual speculators proposing to mine in this country would have had to purchase their privileges from the owners precisely as we have seen is the practice in





into the Provincial chest. Still it may be asked why should this property of the Province be allowed to remain in the hands of individuals who give no return for their privileges; and secondly were it private property would the practice be permitted? The answer to the first question is that it is a matter for the legislature. And to the second:—Undoubtedly were it private property the present practice would *not* be permitted. Yet I deem it not altogether hopeless to draw attention to the matter for it seems to be but right that if persons are willing to speculate with public property they should pay for this privilege as they would have to do were they dealing with private individuals.

British Columbia has regarded this matter in this light and does impose (I am informed) an annual rental of \$100 per square mile. A private individual leasing such property would require a similar provision or else prefer that his property should remain entirely his own, untrammelled by an unprofitable lease which sometime or other might prevent him from granting another lease on more remunerative terms. It is not too late to adopt the system in Nova Scotia. Lessees of unworked areas could be given their required six months notice with the option of renewing their leases with the additional clause inserted. The holders of areas with mines in operation would not side with the holders of unworked areas in opposing any legislation to effect this object since they contend that in the present state of trade the royalty caps any little profit they may make, and that while their property depreciates annually the holders of unworked areas retain theirs free of expense.

**SPONTANEOUS COMBUSTION OF COAL.**—The Royal Commission of enquiry on this subject, which was referred to last year, have brought their investigations to a close and have submitted their report with an appendix containing the evidence brought before them.

The advisability of furnishing any information adverse to the character of Nova Scotia coals has been questioned, and reference made to such information as was published in the Report of the Royal Commission. The object in sending the statements as published was that a position, as correct as our present knowledge warrants, might be given to Nova Scotia coals in comparison with the bituminous coals of England and the United States. In forwarding the conclusions derived from enquiries in the United States and the Upper Provinces, and of local authorities, care was taken to speak of the coals mentioned as a class and not as the product of particular mines lest wrong influences might be drawn and prejudicial comparisons made between those mentioned and those not mentioned. The evidence given cannot be regarded as complete, and as full information respecting the product of any one seam is wanting, an absence so far as is known of circumstances conducive to spontaneous combustion, can no more be accepted as a guarantee of quality than a record hitherto clean can be taken as a guarantee of future immunity from accidents in the case of a mine in which fire-damps exudes.

The statement that nearly all Cape Breton coals heat under certain conditions may be new to the general public but it is not so to large consumers, who are also not ignorant that nearly all bituminous coals are liable to spontaneously ignite, and that therefore the question

at issue is merely one of comparative freedom from a dangerous liability. In England it is openly stated that such and such coals are dangerous to ships and underwriters refuse to insure some of them. In the Report of the Commission, some of the coals more prone to spontaneous ignition are mentioned. As for example Parson's Abbey Gravel Coal, No. 2 Rhondda and Fothergills, Aberdare, of South Wales, Orchard of Lancashire, &c.

The Admiralty have tried the steam coal from Cumberland and Maryland, and although its excellence as a steam coal is acknowledged its use has been discontinued on account of the danger attending its use. On the contrary the Pictou coal was favorably reported on. The experience of the barque "Senator" shows that the semibituminous coals of Broadtop and Clearfield, either one or both, are not perfectly safe. While the actual loss of a vessel from the spontaneous combustion of Nova Scotia coal has yet to be recorded.

Persons acquainted with the coal trade are probably aware of the fact which mine came the coals referred to in the cases instanced in the report of heating on shore, and they may also know that some coals bear a better name in the general market than those from other mines on the same seam.

Designing dealers have proclaimed the danger attending the use of the coals of others to raise, if possible, the character of their own coals as all such subterfuges are, sooner or later, exposed and often react back on a whole district, an honest policy in the long run pays best. If there be any natural want in the quality of our coals and if crude methods of handling are practiced and perpetuated in spite of the experience of others, it is better to acknowledge them and endeavor to remedy them, if possible, than to continue to shut our eyes and deny their existence.

Every one will allow that coals vary in character, that some are better suited for gas, some for domestic, and some for steam purposes than others; again, that some are excellent for specific purposes and are speedily used in the neighborhood of production, while others of inferior quality are better for the same purpose if both are subjected to much handling and long confinement on shipboard. Knowing these things, what we want to get at is the proper position which several coals should occupy in the open market. If our gas coals are put into competition with other gas coals of a well recognized grade, mere saying they are as good will not make them so. We know that Penn and Westmoreland coals bear a higher character and are preferred at some gas works, because they contain a less percentage of sulphur than the run of Provincial coal that goes to Boston and New York, but it is also known that they are none the less liable to spontaneously ignite, and that Cape Breton coal has one advantage over them, which is that it makes better coke.

As to the percentage of sulphur in our gas coals, an average of fourteen analyses gives 2.05 per cent., (vide, Table of Analyses, p. 47, Report for 1875) an average certainly higher than that of the American coals that find their way to the Eastern markets, but not higher than that of the general run of Western coals. The table was published to refute the sweeping assertion of Professor Chandler, of New York, that Provincial gas coals contain from 3 to 5 per cent. of sulphur.

Simply because the run of our coals that are sent to New England and New York to compete with the best American yield a higher percentage of sulphur, they have been under-rated, and such general statements as that of professor Chandler accepted without investigation.

Still, a creditable position is not to be maintained by mere denial of short-comings and by ignoring imperfections. What care will do has been shown by the different characters born by coals from the same seam, but under different management; and every credit is due to the management that achieves such a distinction. Whether that complete preparation which the nature of the several coals will admit of has yet been affected, is a matter of doubt. There is, of course, a limit to the amount of care and handling that will pay, and a radically bad practice may be perpetuated on the plea of the great expense which a change would undoubtedly entail. Whether the character of our seams has been sufficiently well studied is also a matter for question. It is doubtful whether the various companies can tell the relative value and composition of the several plies of the seams they work, the percentage of sulphur and ash in the different plies of the gas coals, and whether the sulphur is collected in "brasses" or streaks, or finely disseminated through the tissue of the coal. If the latter, no amount of hand-picking can reduce the percentage of sulphur, while careful picking can extract the "brasses" and slaty portions.

The range in the analyses' per centages suggests what might possibly be attained by judicious selection, and if the present appliances are not equal to the duty required the seams that cannot be now cleaned do not spoil by being kept for future use.

The enquiry of the Royal Commission established some general facts of value to all interested in the coal trade. Although in a way they are not new, still being the result of cumulative evidence they may be considered authoritative, and, as such, worth noting here.

1. That certain descriptions of coal are intrinsically dangerous for shipment on long voyages.

The degree of danger is not proportionate to the percentage of sulphur contained in the form of iron pyrites. The evidence on this side of the Atlantic show that Cumberland coal, the purest from sulphur that is shipped, has been condemned by the Admiralty. Alberrite, perfectly free from sulphur has yet taken fire. Then the liability to heat of flour dust, freshly burnt charcoal, lamp black and oiled cotton waste, all declare that spontaneous combustion may take place in carbonaceous matter free from sulphur.

2. The effects of moisture on coal as tending to promote spontaneous combustion are most evident in those containing iron-pyrites. "The absorption of moisture by mineral substances of laminated or porous structure, through which pyrites are disseminated, promotes the oxidation of the latter by bringing the atmospheric oxygen, which is dissolved by the water, into more intimate contact with the oxidisable material."

3. The breakage to which coal is subjected is largely dwelt on and the different methods of shipping discussed. My remarks in late annual reports on the handling of coal are borne out by this portion of the report.



there is every likelihood that such an occurrence would be attended with grave consequences.

6.—That it is desirable that any system of blasting coal which entails heavy charges of gunpowder, and an unusual liability to shots blowing out, such as blasting without side cutting or nicking, or using improper material (a) for stemming, should be discontinued.

7.—A large body of flame, such as results from a very heavy charge or from a blown-out shot, is required to ignite coal dust; that in blasting with charges not exceeding 12 ozs., accompanied by the proper preparation of holing and side cutting, there is little liability of this taking place.

As the experiments progressed, the important part which coal dust seemed to play was forced upon the writer's attention. Reference was also made in the paper to an article by Capt. Noble and Mr. Able on "Fired Gunpowder," wherein they drew an interesting comparison between the total theoretic work of coal, which is about 3,400,000 gramme units to the gramme of coal and gunpowder which yields not quite a tenth of that amount. If, therefore, coal could be consumed rapidly it would become an explosive, but as it has to take its oxygen from the air, instantaneous combustion is not possible. The experiments, however, proved that when finely disseminated in dry air it is capable of very rapid combustion. To show this, I will here detail two of the experiments only, though the whole paper might be read by all our coal miners with interest.

A strong iron tube 2 ft. long and  $2\frac{1}{2}$  in. diameter was placed at the face of a bricked slant 45 yards in, the sectional area of which was 30 feet. The stemming was done with small debris and the mouth of the tube directed up the slant. Gauze sheets of thin, easily inflammable material were suspended at intervals of 15 feet, by means of cross pieces of timber from about two thirds of the height nearly down to the thill, and in each cross piece small holes (1 in. diameter and 2 in. deep) were drilled so as to face the blast and were filled with fine gunpowder.

First series. Experiment 3.—Fired  $2\frac{1}{2}$  lbs. powder; canvas and cross pieces knocked down at 15 and 30 ft., but no appearance of flame.

Second Series. Experiment 4.—Coal dust having been scattered on deals the whole length of the slant, (the hill being very wet) fired  $2\frac{1}{2}$  lbs. powder, stemmed with coal dust. Blast very fierce and flame issued from the mouth of the slant, having travelled 45 yards. A metal pipe weighing nearly half a cwt. in the slant was driven 15 yards and a coal tub on the pit heap 75 yards distant was moved by the blast.

So long ago as 1846 Professors Faraday and Tyell wrote: "In considering the extent of the fire for the moment of explosion, it is not to be supposed that firedamp is its only fuel; the coal-dust swept by the rush of wind and flame from the floor, roof, and walls of the workings would instantly take fire and burn, if there were oxygen enough in the air present to support its combustion; and we found the

---

(a) coal dust.

lust adhering to the face of the pillars, props, and walls in the direction of and on the side towards the explosion, increasing gradually to a certain distance as we neared the place of ignition. When examined with a glass it presented the fused round form of burnt coal dust, and when examined chemically, and compared with the coal itself reduced to powder, was found deprived of the greater portion of the bitumen, and in some cases entirely destitute of it. There is every reason to believe that much coal-gas was made from this dust in the very air itself of the mine by the flame of the firedamp, which raised and swept it along; and much of the carbon of this dust remained unburnt only for want of air."

Mr. Galloway, H. M. Inspector of Mines, read a paper before the Royal Society, in March, 1876, also on this subject, entitling it

#### "INFLUENCE OF COAL DUST IN COLLIERY EXPLOSIONS."

It will be sufficient here to give only a few extracts, for his paper is a lengthy one. "The accounts of colliery explosions published in this country hardly ever allude to the existence of coal-dust.\*" This seems all the more remarkable when it is remembered that a mixture of air with several combustible solids in a finely divided state is explosive at ordinary pressure and temperature, and that some serious explosions have been caused by the accidental ignition of very fine dry flour suspended in the air of confined spaces. The subject has attracted more attention in France. In the "*Annales des Mines*," 1875, there is a paper by M. Vital Ingenieur des Mines. He describes in a very minute manner all the phenomena produced by an explosion in the Campagnac colliery. A shot which blew out the tamping, was fired in one of the working places in a seam of bituminous coal, and was accompanied by an explosion which burnt three men so seriously that they died within a week. No firedamp had been detected in this place at any time, but as the floor was covered with very fine, dry coal-dust and as the shot was fired at the bottom of the face, and would consequently raise a cloud of dust, it was concluded that nothing but the instantaneous combustion of coal-dust under the influence of the shot could account for the accident.

In concluding M. Vital says:—"Very fine coal-dust is a cause of danger in dry working places in which shots are fired.

In well ventilated workings it may of itself alone give rise to disasters.

In workings in which firedamp exists it increases the chance of explosion.

And when an accident of this kind does occur, it aggravates the consequences."

Mr. Galloway summarizes the results of his experiments and observations as follows:—

1. A mixture of firedamp and air, in the proportion of one volume of the former to 60 or more volumes of the latter, gives no reliable indication of the presence of the inflammable gas when tested in the manner usually, if not always adopted in mines.

2. A mixture of firedamp and air in the proportion of one volume of the former, to 112 of the latter, becomes inflammable at ordinary

pressure and temperature when charged with fine dry coal dust, such as that which is to be found on the roadways in dry coal mines. It seems, therefore, only reasonable to conclude that an explosion originated in any way whatever in a mine of this class, may extend itself to remote parts of the workings where the presence of firedamp was quite unsuspected.

He further writes :—Before leaving this part of the subject it may not be out of place to make a few remarks on the influence of blasting shots in giving rise to explosions in mines. In a paper on this subject published in the Proceedings of the Royal Society, 1874, experiments were described which showed that an intense sound wave, such as that originated by a blown-out shot, was able to pass the flame through the wire gauze of a safety lamp burning in an explosive mixture.\*\* There can be no doubt but that the gases which issue from a shot hole have a sufficiently high temperature to ignite an explosive mixture of firedamp and air if they immediately pass into it.\*\* And it may reasonably be supposed that if a similar shot were fired in various mixtures of firedamp and air the flame would be prolonged more and more as these mixtures drew nearer to the explosive point, somewhat in the same measure as a cap on the flame of a lamp would enlarge under similar circumstances. This prolonged flame might even partake of the nature of a local explosion of firedamp, especially if augmented by the presence of a small quantity of coal-dust, although the existence of any explosive gas might not have been discovered previous to the firing of the shot.

It has often been observed that disastrous explosions happen most frequently during winter months, and during very cold weather.\*\* If it is assumed that the magnitude of some colliery explosions has been increased by the presence of coal-dust in the workings, and that the hygrometric state of the dust changes with the humidity of the air with which it is in contact, then it is obvious that explosions are more likely to occur when the air is driest; for at such times the coal-dust will not only be more easily raised in the air by a local explosion, but it will also be burned more easily than when it contains a larger proportion of moisture. Taking for example the case of a dry mine in which the temperature of the workings is 70° Fahr. In warm weather the air enters at a temperature of, say 60°, and is at the same time saturated with vapor, for there is usually some water trickling down the sides of the main shaft. The temperature rises as the current approaches the faces and attains its maximum when the newly exposed faces have been passed. The humidity also has been increasing to some extent but never to complete saturation in a mine of this kind. In very cold weather, on the other hand, the current may have a temperature of 30° or less, when it reaches the bottom of the shaft, and since it passes through the same workings, its temperature also rises to 70°. Now, as with a rise in temperature the power of absorbing vapor increases, it is plain that in the latter case, the ventilating current must either obtain an additional supply of moisture from the workings (about  $\frac{1}{2}$  lb. for every 1,000 cubic feet of air and that is not obtainable in a mine of the kind) or it must be drier than in the former case at every point of its course. *Prima facie* then, this process of reasoning leads us to the conclusion that explosions





To the United States the exports decreased 18,112 tons and in all only amounted to 71,634 tons. They are now not of so much consequence as the trade with New Brunswick or the islands of Prince Edward and Newfoundland conjoined. The condition of this branch of the trade was so fully explained in Messrs. Perkins and Job's statement in the previous report that it does not call for further comment this year. But bearing on it as of some interest a table is appended of the values of exported and imported coal from and to the British American colonies, taken from Dr. Young's able statistical Reports to the Treasury Department, Washington. With it there is also another table which shows the rise and decline of Nova Scotia's coal trade with the United States.

The falling off of nearly 11,000 tons in the trade with Newfoundland was partly expected on account of the over-supply taken in 1875, and doubtless the long strike at Sydney Mines further reduced the exportation to that Province.

Prince Edward Island took 3,000 tons more than in 1875 for use on the Railway.

New Brunswick is credited with having taken 16,000 tons more than during the year before, but this amount will probably be much reduced when a modified statement is received from Spring Hill. The returns having included among the New Brunswick shipments all coals sold to the Intercolonial Railway, wherever used, because the office is at Moncton.

The Home Consumption has increased 13,000 tons which is altogether due to the demand for slack at the Albion Mines for the manufacture of coke to be used by the Steel Company of Canada.

To the courtesy of Mr. C. J. Brydges, General Superintendent of Government Railways, I am indebted for the statement, to be found among the appended tables, of the distribution of coal along the line of Railway. The statement is of interest, as showing that a trade has been opened as far north as Campbellton, and that the traffic in coal is by no means inconsiderable. In addition to the statement respecting the business of the road, Mr. Brydges states that the Railway Department received for its own use from

Pictou collieries.....	15,145 tons
Cumberland collieries.....	33,456 "
Total.....	48,601 tons.

The modified statement sent in by the Spring Hill Mining Company shows that the Railway Department took from them 33,224 tons during the year. 1st quarter, 4,894 tons; 2nd quarter, 4,530 tons; 3rd quarter, 10,545 tons; 4th quarter, 13,255 tons. The increased consumption during the last quarters arose from the additional demand which the opening of the road in the summer entailed. And estimating the requirements of the Railway Department for the current year from the figures given above, it seems not unreasonable to suppose that they will amount to no less than 65,000 tons.

The possibility of a trade being opened with Ontario has been considered. But the want of return freights and the competition from

to present what at present appear insuperable obstacles to a possible encouragement of "home production."

Mr. McGregor, M. P., Essex, in his evidence before a special committee at Ottawa, in 1876, on the Recent Depression of Trade, &c., he was interested in a colliery in the Shawnee Valley, which sent some 75,000 tons into Canada in 1875. The coal shipped at Sandusky, 160 miles from the mine.

The coal cost at the mine.....	\$0.90
Freight per railway.....	1.60
Shipping charges.....	0.25

Cost f. o. b. Am. Cy.....\$2.75 per 1,000 lbs.

Freight, he stated, was about 50 cents by vessel to Windsor and Port Stanley and \$1.25 to Hamilton and Toronto. The price of the latter city of good American bituminous was, I am told, \$3.876, and at Brockville \$4.15 per ton. I am further informed by a reliable authority that the cheap Ohio coal, largely used in Ontario, is much inferior to the bituminous coal of Cape Breton.

The total produce for the year 1876 is given as 709,646 tons in the report not note to the table on "Coal Produce" in the last report, it is suggested that the produce for the year 1875 was underestimated by 15,000 tons. The quantities given are, in many cases, estimates, for most of the coal is not weighed as it comes to the collieries believed to return an underestimate are among which show more sold than produced, but all so showing have been so, as a few had stocks on hand at the first of the year. The case of the International Company, the difference between the stocks on hand at the end of the years 1875 and 1876 is 1,617 tons, which, added to the produce of 1876, is still some 3,152 tons below the sum total of the quantities returned as sold and consumed at every. Similarly estimating, the Blockhouse shows a deficiency of 9 tons, the Scotia 343 tons, and the total produce from all collieries, when the difference shown in the stock accounts is added, is less a deficiency than 12,953 tons.

The Diamond Drill, owned by Mr. Logan and others of Pictou County, is further employed in searching for coal in Cumberland County, in proving the further easterly extension of the Joggins series. In view of the efficiency and economy of the machine, it may be mentioned that a hole 1,071 ft. deep was bored in 33 working days, the work taken up was 45 days. Only 4 men were altogether engaged, as they worked in two shifts. The greatest distances bored at various depths in twenty-four hours were 63 ft., at a depth of 34 ft., at 650 ft.; 41 ft., at 785 ft.; 30 ft., at 900 ft.; and 2,000 ft.

A second hole 1,064 ft. deep was also bored at River Hebert. Presently the machine was taken back to Pictou County, where it is successfully employed in boring an artesian well.

What to do with the waste coal is a serious question at several of the collieries in Cape Breton. It is felt that while large coal is in such small demand at the present low prices, it is impossible to find a market by water for all the small and inferior coal. That there is little or no local demand, is indicated by the heaps of slack and waste coal about the pits and along the lines of railway at some of the collieries.

A local demand has always been considered the great want in Cape Breton. If only some manufactories could be started that depended on cheap fuel for successful competition with foreign-made goods, total stagnation might be avoided and a greater regularity or, at least, some little occupation furnished to the colliers and laborers during the season of the year when shipping is impossible and the banking of great heaps of coal inadvisable.

Cheap fuel is recognized as the great lever of the age, but, unfortunately, although favorably situated for the importation of raw materials and the exportation of manufactured products, these very same facilities militate at present against the establishment of manufactories in Cape Breton, since the balance of trade is against Canada. An excess of tonnage being required to export her timber and grain and coal, the less bulky and more valuable articles of commerce are brought into the country at merely nominal rates by vessels seeking outward freights. Even such bulky articles as salt, coal, and iron are carried at very low rates.

Mr. J. Lionel Smith, of the Geological Survey of Canada, writes that "ship-owners are often glad to load their vessels with salt for Quebec or Montreal, at mere nominal rates of freight, in preference to carrying dead or waste ballast, which, besides the cost of loading and unloading, involves heavy expense for lighterage. Fine salt from Liverpool is frequently laid down at Quebec at five shillings sterling per ton of 2,240 lbs., while solar, and sometimes coarse salt, are brought out simply as ballast, without any freight charge."

Coal and pig iron are also taken by timber ships for ballast. During the past spring the rates to Quebec were about 7s. per ton, while contracts were at the same time made to carry coal from Pictou to Montreal at \$2.12. So that it appears coal was brought across the Atlantic from Cardiff at 44 cents less freight than it could be taken from Pictou up the Gulf. The rates from Pictou fell during the summer to \$1.87 and \$1.75 per ton, but even the lowest of these rates still placed the Pictou coals at a disadvantage in comparison with Scotch and Cardiff coals.

During the season of prosperity, 1871-73, iron making in Cape Breton was seriously considered, for many excellent beds of ore have been discovered, which could be easily wrought. But while the present condition of trade exists, it is very doubtful whether sufficient inducement can be held out for the inception of so important an industry as the manufacture of iron. In the meantime, however, it may be found profitable to open some iron mines and export ores for admixture and reduction with other ores elsewhere.

The suggestion has been made that at such of the collieries of Cape Breton where the slack coal that is unsaleable and is now either left underground or carted into waste heaps, or used as ballast on the railways, a use might be found for it in the manufacture of salt from

sea water. Certainly several of the collieries could deliver it at shore for a very few cents a ton for the conveniences, for dumping coal at places where the brine, undiluted by admixture with water, could be pumped into tanks, cannot be exceeded. Carded boilers could be converted into pans and used experimentally when if they were found to pay expenses, they could be replaced by properly constructed pans, which would work to much greater advantage.

If it should only be found that the Wootten plan of consuming fine coal under boilers, as has been tried with apparent success by Mr. Hoyt at the Acadia Colliery, is really as satisfactory as it appears to be, it will effect great economy. The method was devised and perfected for the utilization of anthracite coal dust as it is, without any preparation; and so successfully, that the results, it is stated, are almost equal to those obtained from the use of lump-coal.

The plan consists of injecting air into a closed ash-pit by means of a steam jet passing through tubes. The mingled air and steam rise up through perforated plates on which the fuel is spread to a depth of some three inches. The plates are of wrought iron and the perforations are about three-eighths of an inch in diameter on the upper face and larger on the lower, and from two to three inches apart. The fuel is frequently rabbled to prevent the formation of clinkers and to aid in the removal of the ashes.

Whether the dust from the caking coals of Cape Breton could be utilized by this method is open to doubt; but if further trials at the Acadia Colliery confirms the present belief in its successful application with the duff of that coal, experiments should be made with that of Cape Breton, since the percentage of waste coal there is great.

## CUMBERLAND COUNTY.

The stimulus given to the coal trade of the county by the opening and extension of the Intercolonial Railway is very marked, and reference to The Coal Trade by Counties, table A will show. From a sale of 14,153 tons in 1872 it rose to 26,345, to 49,599, to 60,944, to 84,528 tons in each succeeding year; the last stated quantity being that of the year 1876. Hitherto the Spring Hill Colliery alone has benefitted by the completion of the railway and its sales have risen to 67,731 tons, the third largest of the past year. The opening of the Spring Hill and Parrsboro' Railway, which is expected to take place during the current year, much of the track being now laid, will furnish additional facilities for the development of this field. A sale of at least 15,000 tons more may reasonably be expected to be made during the current year.

The two companies, the Joggins and Cumberland, mining in the Joggins area have ordered a survey of a line of railway from their mines to connect with the Intercolonial Railway at Maccan Station, considering that they may profitably compete with the Spring Hill Colliery for the large and growing trade along the line especially during the winter season.

---

## COLLIERIES.

### SPRING HILL.

The coal company having obtained possession of the short branch line from the Intercolonial Railway to the Colliery, now deliver their coal at the junction, working the line with their own engine. This Colliery has an advantage over all others in the Province, in that its sales are little affected by the seasons, the railway requiring supplies in winter as well as in summer; while, as is very well known, in Cape Breton coal sales are restricted almost entirely to the shipping season.

Near the Byers pit by the side of the railway a shed 300 feet long by 12 feet wide has been put up for the storage of nut and small coals, separated from the slack in the circular screen.

In the pit the west level has now a length of 22 chains, and the east level 20 chains. Going east the dip of the seam increases and at the face of the level it is  $36^{\circ}$ . The parting also increases in thickness and now measures 17 feet, splitting the seam into two portions, the upper 5 ft. 4 in. and the lower 4 ft. to 4 ft., 6 in. in thickness. Levels are being driven in both.

It is contemplated to open a pit on the 6 ft. seam to meet the increasing demand along the Intercolonial Railway.

### SCOTIA.

The working of this Colliery has been as hitherto confined to supplying the local demand; the branch railway to the pits never having been put in such order as to admit of the trucks of the Intercolonial Railway entering on it and affording a connection with distant places.

### SOUTH JOGGINS.

The business of the past year was but little better than that of the preceding though a rather brisk trade in the spring promised much more. The irregularity of the trade greatly interferes with the economical working of the seam, which is satisfactorily mined by the system described in the last report when the output is regular.

### CUMBERLAND.

The slope for the second lift in the Cumberland seam has been completed and at a depth of 730 ft. levels have been driven east and west. The seam averages some 32 inches in thickness; it is mined at some disadvantage at present both the floor and roof being of fireclay. The bords have been opened 18 ft. wide and an 8 yard pillar has been left between the main and water levels. Shipping has been effected by means of an incline through the cliff to the wharf which has been repaired.

## PICTOU COUNTY.

This county felt the depression in the coal trade more than other, the total sales being less by 61,584 tons than those of the previous year. The shipments show a still greater decrease and land sales increased no less than 16,508 tons. The leading colliery, the Albion, disposed of 5000 tons more than in 1875, but this was in slack converted into coke for the use of the blast furnace at Londonderry. The whole loss of last year's trade was exceeded by a decline in the shipments to the province of Quebec, the fall in exports amounting to 63,025 tons. The excess in the Home Consumption of 16,586 tons, was met by a further decline of 12,033 tons in the exports to the United States, an absence of shipments to South America, and a slight decrease in those to New Brunswick and Newfoundland. Some 3,000 tons more were sent to Prince Edward Island, though the quantity of slack sent was about an equal amount less; the difference being 6000 tons, being just the quantity contracted for by the Railway Department. The price, it is understood, was \$3 per ton delivered at the three ports of Georgetown, Charlottetown and Summerside, and freight for the whole quantity was had at 80 cents per ton.

Freights to all points were much lower; in the coasting trade to Halifax there was a decline of 15 cents from \$1.30 in 1875; to Portland they declined from \$2.25 to \$1.90 a ton; to Portland to \$1.80 a ton. Montreal steamers made contracts at \$2.12½, while odd cargoes were taken at \$1.75, and sailing vessels averaged \$1.87½ per ton.

## COLLIERIES.

### ACADIA.

In the pit the dead work has been continued and the faces on both sides in the lowest lift are in some 17,000 ft. from the surface, the distance between the barriers on these levels will be 5000 ft., the extreme limit that the area will allow. The roof on the north side has given more trouble than hitherto in the working, in consequence the pillars have been increased to 15 yards in thickness. A second plane-way on this side has been broken off, and on the south side a second is now ready 700 ft. inside the first, so that the mine is well forewon and in a condition to throw a large quantity of coal when demand arise. A proposed modification of the plane-way mentioned in the last report by which the back-balance should be in a four by four ft. way in the lowest bench of the seam. This has been done in the newest plane-ways and it is hoped it will enable a larger per centage of the coal to be recovered when the pillars are brought back.

A barometer is now kept in this pit and regular observations are taken and recorded. By the mining law of Great Britain this is compulsory, but it is not so here, and only the General Mining Association, the Halifax and Vale Companies besides the Acadian require it.

On the surface two experiments having an important bearing on economy of colliery consumption and marketable coal have been made. First, the consumption under the colliery boilers of the "duff," the waste coal from the screened slack, spoken of elsewhere as the Wootten method of utilizing waste coal: Second, the cleansing the duff, which averages about 8 per cent. of the total quantity mined of the shaly portions. This is effected by washing in a long trough. Intermittently duff is shovelled in at the upper end, the sluice gate opened, and the material as it is carried along by the current of water stirred with a rake to prevent the unequal settling of the heavier and stony particles; then the water is turned off, the sediment shovelled out of the trough and the washed coal collected from the receptacle at the lower end. The operation is then repeated. It was found that one-half of the duff was marketable coal and excellent for black-smiths use. Sufficient trial was not made before frost set in to test the commercial value of the experiment.

#### ALBION.

The present engines at the Foord pit have slide valves which although fitted with friction rollers, are heavy to handle, and troublesome to keep in order. New engines have been obtained to replace them which are fitted with double beat Cornish valves, and work without the slightest strain. These new engines are 2 inches larger than those they replace, and they are the only pair of 38 inch cylinders in use in the Province. Being fitted with Cornish valves, one man may easily tend them, and more securely than two could the others with slide valves.

The heavy fault met with in the so-called north level of the Foord pit, about a mile from the pit bottom, has been at length pierced by a drift 110 yards long. Beyond it the coal is found lying apparently regular, but turned round about 100° and the level now has a north-easterly course. In the deep seam, opened by a pair of stone drifts, from this pit a pair of headways has been put up to the rise 150 yards, and levels started to the north to open that seam. A scale of 13,000 feet of air ventilates the new winning. To connect with these workings, that those of the Cage pit may be drained of water by the Foord pit engine, a pair of drifts are being driven towards them from the bottom of the Cage pit workings. The drifts are being put down in the top coal which has a thickness of 3 ft. 6 in. This coal rests on 9 in. of cannel which in its turn overlies the stone parting, of 1 ft. thick, that separates the upper from the main portion of the seam. The bed of cannel is of good quality, but is of less thickness elsewhere and only 1 in. thick where cut by the drifts from the Foord pit.

Hitherto much trouble has been experienced during cold weather by the formation of ice in the winding shaft, which is the down cast for the air. To prevent ice from forming on the slides and obstructing the passage of the cages, Mr. Hudson has put upon the bank-head a hot-air stove, which he finds warms the intake sufficiently for that purpose.

In the Cage pit the lower levels are being driven both north and south. Off that on the north side one counterbalance is already at





of tar and grease a handful of lime is added. Through this mixture, while hot, the rope is run and then through a box full of sawdust, which forms a coating not easily removed. This rope is of steel.

The slope has been thoroughly drained and so strengthened by additional timbers that all signs of subsidence have ceased.

The fault met with in the workings on the west side of the pit increases in width to the deep. In the upper level it was 7 yards, in the lower it is 11 yards. Where the workings reached the fault, the pillars have been brought back, much of the timber being drawn at the same time. The capacity of the pit and the facilities for output have been much increased, and are now equal to 1000 tubs a day. With other collieries of this county, this colliery has been unable to meet the demand for screened slack.

## CAPE BRETON COUNTY.

Less trust in specious hopes of a speedy resumption of activity in coal mining was placed by the working men of this county during the year than in 1875; and the wisdom of the many who sought to eke out a livelihood by such planting and fishing as they could command was shown in the result of the year's business. The total coal production of the county was only 304,102 tons, and the sales of round coal decreased 40,256 tons and were *less than half* of what they were in 1873. The sales of slack, however, were in excess some 4,362 tons, the shipments of that quality to the United States being increased. The decline of 11,039 tons in the supply of the Home Consumption, outside the local demand which shows a small increase, may be accounted for by the decreased production at Sydney Mines in consequence of the two months' strike in early summer. Attention was called in the last report to the unusually large stocks of coal held at St. John's, Newfoundland, in the winter of 1875-6, and as was expected in consequence the shipments thither in 1876 fell much behind those of the previous year. Much of the coal that went to Montreal was for the use of the gas company of that city. The Montreal gas company annually consume some 30,000 tons altogether, of which 5,000 tons are of cannel coal imported to enrich the quality of the gas. The company find that Provincial coal yields in summer time 17 candle gas.

## COLLIERIES.

### SYDNEY.

The strike of the workmen at this colliery has already been mentioned. It lasted from May 27th until August 1st. Regarding it from the most confined and favorable point of view it can only be considered a most ill-advised proceeding, for the workmen gained not a single concession besides losing their time and consuming their savings. Looking at it also in the same light, the time was most inopportune, for competition was keener than in former years for the

declining market, and no permanent advance in wages could possibly be expected under such circumstances. Strikes have been prominent and again all the world over to result most disastrously for men themselves. In the present case had the slight concession asked or been granted it would have taken a long time for the men to recoup themselves for their loss of two months labor. The strike cost to the county the circulation of \$45,000 which would have been paid out in wages alone, besides the loss of business which the shipping given from the port, would have given. In 1864 a strike at the colliery lasted for thirteen weeks and ended unfavorably for the men.

During the strike operations at the New Winning were discontinued. They have since been resumed and the winding shaft, 13 ft. diameter, is expected to be down to the coal by next June. Since water bearing strata have been pierced and tubbed the sinking has been continued dry. The pumping shaft now completed is 11 ft. diameter and is 709 ft. deep to the sump bottom. It is temporarily fitted as a drawing shaft. The staple shaft completed is 389 ft. deep and 6 ft. 3 in. diameter.

The following memorandum of tubbing used in the three shafts has been given by Mr. Brown; it is of interest as showing the additional expense entailed by the heavy feeder of water met with during the sinking:—

	Depth tubbed.	Segments.	lbs.
Winding Shaft.	275 ft., 6in	took..1,269	weighing..658
Pumping	" ..284 ft.	" ..1,168	" ..569
Staple	" ..283 ft., 3in	" .. 736	" ..323
	842 ft., 9in	3,173	1,552

A self feeding boiler grate, known as Jukes' Furnace has been some time under trial, and Mr. Brown considers it a success in saving labor and fuel. The coal is dumped into a hopper which has its mouth over the end of the grate that projects beyond the front plate of the boiler. The grate is endless, made of short plates linked together, and is slowly driven by a small engine. The fuel at the front end of the grate ignites from that already in a state of combustion, and by the time it reaches the back end it is consumed. The ashes drop off as the grate continues to revolve.

The new shipping wharf is now so far completed that it can be used for vessels of large draft. It will ultimately be fitted with balanced platforms and shoots. Flat bottom wagons with end doors will take the place of the hopper wagons now in use, and no breakage of the coal avoided. The advantages attending the careful handling of coal have been touched on in the two last reports. It is sufficient here to add that any one interested in the subject will find information bearing on it in the report of the royal commission on the Spontaneous Combustion of Coal in Ships.

#### LINGAN.

A new winding engine is in course of erection at this colliery. The dimensions are given in the table of machinery and a reference made to the one which it replaces.

---

Besides the ordinary pitwork part of the slope has been retimbered and the roads opened through the falls occasioned by the fire in 1873.

During the winter a headway and a level on the north side were driven; and in the summer, besides this narrow work, rooms were worked off the level, and a few pillars on the south side were removed. The level on the south side is in 28 chains.

#### COLLINS.

The facilities for mining at this colliery have been largely increased; the slope has been finished and has now a total length of 1000 ft. The new engines, etc., are described in the general table of machinery. The tubs adopted hold half a ton, and the surface cars two-and-a-half tons each. The seam varies in thickness from 5 ft. 3 in. to 5 ft. 6 in., and the coal, judging by the business, takes well in the market. To aid the shipping a balanced drop has been contrived by Mr. Scott, the manager. The car runs on a balanced platform at the end of the wharf, which rocks forward on hinged posts so that the weight of the coal takes the platform and wagon forward and downward over the hatch of the loading vessel. When the coal is discharged the counterbalances take the platform back to its original position. The movement is controlled by a brake. By this contrivance the fall of the coal into the hold is diminished by 8 to 10 ft., but it still has a fall of no inconsiderable depth until a cone of coal is formed up to the combings of the vessels' hatch.

#### RESERVE, EMERY AND SCHOONER POND.

These collieries of the Cape Breton Company (Limited), mined no coal during 1876. The pits at the Reserve and Emery were kept pumped out. The coal sold was what remained on the banks after the previous years' shipments were over. The Schooner Pond coal had been out for two years and yet sold freely at a fair price for steam purposes. This speaks well for the character of the coal. Some explorations have been made by Mr. Rumble with a view of testing the value of other areas belonging to this company.

#### VICTORIA.

The workings have been chiefly on the east side of the slope from the level to the barrier. The east level is in some 1600 feet.

#### GLACE BAY.

The operations during the winter were confined to narrow work. The level in the Harbor pit was extended some 625 ft., giving it a total length of nearly 4000 ft. The main innermost headway is an incline about 1000 ft. in length. It is hoped that the coal for the current year's trade will be taken from the Sterling pit workings, for during the summer the pumping pit was drained and a place driven up under the unfinished winding shaft and a bore-hole was put down to it to carry off the water, that the sinking might be continued dry. This

was done, and the work of opening out a pit begun; but, unfortunately, in Christmas week, the pumps were drowned out, and mining consequently stopped. The detention is reported to be but temporary.

#### CALIFORNIA.

This colliery did a steady business, considering the general dullness of trade, during the season. No new work was done beyond necessary maintenance. The system of storing the coal underground has been continued, thus giving more work to the miners than would be given were banking practiced. It is considered that by stowing the coal back in the rooms behind the headmost crosscuts that coal deteriorates much less than when exposed to every alternation of temperature, to frost, rain, and sunshine, as it is on the surface. The loss and expense of lifting is perhaps also diminished when the quantity so stowed is not very great. As has been before remarked, this system is not one that can be extensively adopted.

Many of the rooms to the rise have been discontinued and but few pillars have been removed. The main levels to the west are now within 5 chains of the boundary and as the boundary is the tortuous course of the Little Glace Bay brook, an additional thickness of barrier will be left to guard against the waters of the brook percolating into the workings in the event of any subsidence taking place.

#### GARDINER.

This pit was kept pumped out, but no coal was drawn from it in 1876.

#### INTERNATIONAL.

This colliery did not work during the winter, but opened the pits in the spring and mined from the borders both above and below the water level.

#### ONTARIO.

The mining has been in the lowest lift on both sides of the slope which is in a distance of 510 ft. on the dip of the seam. The levels extend 400 ft. towards the shore and have about 200 ft. more to go before reaching the barrier. An additional thickness of barrier besides that required by the lease has been promised to be left to guard against any subsidence making a communication with the sea. The danger is of so serious a nature that too much care cannot now be taken to prevent the too near approach of the workings to the shore. The annual denudation of the cliffs being considerable, it is said, much as 8 in. a year, subject of course to be accelerated or retarded by local conditions, the necessity for considering the future interests of such a property as this is very apparent.

#### BLOCKHOUSE.

This colliery was idle during the winter, and when working during the shipping season about one-third of the produce was taken from

pillars and the rest from the solid. Eight new boilers replaced those hitherto in connection with the engines at the shaft and incline.

#### GOWRIE.

Operations were chiefly confined to that section of the pit above the upper level, lying 300 yards to the north of the self-acting incline, which lowers the coal from the upper to the lower level on its way to the shaft. The plan of working in this section has been before described; a ten yard bord is taken up, the centre of which is stowed with slack and stone a road being left on both sides. The pillars which are 6 yards thick are worked back within one of the face.

#### SOUTH HEAD.

The Returns show that a small quantity of coal was mined from this area.

### VICTORIA COUNTY.

Some explorations for coal were made at Big Baddeck but the indications as yet exposed are not very encouraging.

#### NEW CAMPBELLTON.

The produce of this colliery has been small. An adit is being driven in the seam to carry off the water made in the rise workings, when complete it will have a length of 2200 feet. More attention has been paid to the ventilation. On the surface an 1½ in. pipe has been laid for 1500 ft. from a dam on a brook to convey fresh water to the boilers.

### INVERNESS COUNTY.

Some explorations are said to have been made about Broad Cove, but no return has been sent to this office.

#### PORT HOOD.

This new colliery labors under the great disadvantage of having no suitable shipping place. The destruction of the sand bar connecting Smith's Island with the main land of Cape Breton exposes the harbor of Port Hood to the north and west winds, and no shipments are in consequence possible in the autumn from the public wharf, which is at present used. Still considering the want of facilities this colliery has established a small trade, and the coal has obtained a good reputation as a house and steam coal.

At a depth of 660 ft. on the slope a pair of levels have been driven to test the quality of the seam, but no work has been done above that point, the thickness of the measures overhead giving no more than the minimum of cover required by that clause of the mining law which

relates to submarine workings. The future interests of a colliery in the position that this is are so enormously disproportionate to the present small advantages to be gained by an infraction of this clause that attention to the very letter of the law in this respect cannot be too strictly enforced.

A description of the machinery erected at this mine is given in the appended tables. The boilers are hung in one set from three beams of timber. The rope is of steel.

## COLCHESTER COUNTY.

The locality from which the 12 tons, shown in the tables to have been sold in this county, were extracted, was fully described in the last annual report.

## COLLIERY MACHINERY.

Scattered statistics respecting the machinery in use at the several collieries have been published in the annual reports as engine by engine have been erected. In the Canadian Geological Reports of Progress statistics somewhat similarly arranged, may be found inserted in the papers relating to the several coal fields. A comparison of the annexed tables with the data given in the report 1872-3, on the Breton coal field, will show some discrepancies, and reference is made to them lest the general accuracy of the figures given in the annexed tables might be questioned. As the following statements were courteously furnished in writing by the several managers in response to special enquiries, they may presumably be taken as more reliable of the two; still inaccuracies may have inadvertently crept in, though much of the data has been verified.

## VENTILATION.

To control the ventilation of the underground workings, furnaces are in general use. On the same principle of rarifying the ascending column of air, one or two pits are regulated by turning the exhaust steam from underground engines into the upcast. Only two have been seen where air which courses through their workings controlled by fans driven by steam engines on the surface. The air is exhausted. The fan at the Foord pit is among the largest made, though it is surpassed in size by some in England. The advantages which fans possess over furnaces may here be mentioned as not irrelevant to the object of these reports. Among them are the following:—Power of speedily increasing the volume of air in cases of emergency, of permanently increasing it by forethought has erected a fan of ample size, of giving a free circulation in extended shallow workings where a high heated column of air is unattainable, and lastly of extracting explosive mixtures without danger, though this may be also attained in fiery pits by conveying the returns by a dumb drift into the upcast above the furnace supplying the furnace by a scale of fresh air. With them there is

no danger of setting the coal on fire, as furnaces, even thought to be well contrived, have been known to do. Neither of the Fans erected at the Foord and Drummond pits are required to work at their full capacities.

At the Spring Hill Colliery the furnace described is at the surface, the least advantageous position for a furnace to occupy under ordinary circumstances. The temperatures given refer to the East slope—the furnace being at the Hall pit—and the upcast temperature is obtained from the waste steam from the direct acting steam pump. This steam pump, by the way, now exhausts into the suction pipe. The exhaust steam from the steam pump at several other collieries also assists the ventilation by heating the return air course. At the Gardener Colliery the ventilation entirely depends on the heat of the waste steam.

In the winter season at many pits the natural ventilation is sufficient and artificial means are only required to keep the currents constant. At the Foord pit when the external air is 33° Fahr., the current has a temperature of 47° at the bottom, 53° at the working face, and 55° at the bottom of the upcast to the fan. The highest temperature in any return air course is recorded of the Reserve pit, 72°, an increase of 10° above that of the external air, and as the workings are shallow with a natural temperature of about 45°, this increase must be due to the warmth from the bodies of the men and horses, and from the lights, etc.

The downcast temperatures indicate that the observations were taken at different seasons of the year and that therefore they cannot readily be compared together. In noting the increase of temperature due to the working of the pit, it is necessary to consider the influence of the natural temperature of the measures according to the season of the year and the condition of the mine, whether wet or dry. The figures in the column Least Sectional Area of the Air Course do not represent the average area but the size of overcasts or cross cuts through which the air is coursed in any return air way. The last column in the table on Ventilation shows that the total quantities of air circulating per minute are in most cases considerable, when the extent of the workings is considered, and sufficient if only the air is advantageously conducted round the faces. As an aid to the proper distribution of the air it may here be repeated that under-managers would find a working plan with the courses of the air clearly defined a great assistance.

The dimensions of the various furnaces show a diversity of style, of questionable advantage in some cases, as in those of which the dimensions vary greatly from the type found to answer best in England. Professor Warrington W. Smyth in his lectures before the Royal School of Mines, states:—"Take the case of a pit of not very large size in North Staffordshire we shall find the furnace constructed of side walls 3 ft. high, then the fire bars supported on a girder of iron, and above that an arch 3 ft. high, the breadth of the whole being 6 feet. \* \* \* In the large Clay Cross pits the furnace has a width of 9 ft. from wall to wall, the girder is put in at a height of 4 ft. 6 in. and there is a height of 5 ft. above the bars. As a rule 3 ft. beneath the bars appears to be sufficient."





with a pressure of 50 lbs. to 60 lbs. of steam, and nearly all are fired externally. At Sydney Mines, "Jukes' Furnace," a self-feeding boiler grate has been adopted and Mr. Brown reports it as a success in saving labor and fuel. At all the other collieries the ordinary hand firing is practised except at the Acadia where Mr. Hoyt has lately introduced the system of having jets of steam under perforated plates in the place of fire bars and consuming the fine coal dust and waste with economical results.

#### PUMPING ENGINES.

Direct acting steam pumping engines have been largely adopted and more than half the collieries are now drained by their aid, as a reference to the table will show. Their advantages and disadvantages have been mentioned in previous reports and need not be here recapitulated. Some of the auxiliary pumping engines are not given in the table, as the steam pump which drains the deeps of the Cage pit workings. This engine receives its steam through 1000 yards of jacketed pipe at a pressure of 24 lbs.; the pressure on the boiler is 60 lbs. which is reduced to 50 lbs. at the receiver underground. The direct acting steam pump in the Vale pit receives its steam through 980 ft. of unprotected pipe and the pressure is reduced from 60 lbs. on the boiler to 43 lbs. at the pump.

At the Emery colliery two pumps are placed side by side. The Gardener also has two, keeping the second in reserve for emergencies. The second pump draining the lowest lift at the Victoria pit is not entered in the table. It is about the same power as the one mentioned.

The largest set of pumps is at Sydney Mines, with working barrels 20 inches in diameter. The largest direct acting steam pump is at Spring Hill, forcing water in one column to a height of 427 feet. This duty is surpassed by the pump at the Nova Scotia colliery which discharges at a vertical height of 560 feet.

---

## GOLD MINING.

---

Judging by the past records of this country, it would seem in gold mining no great prizes are to be drawn by lucky finders of large nuggets, valuable washings, and fabulously rich veins, but that success is more likely to attend the diligent explorer, and the systematic and economical worker. It has certainly been so with our fortunate gold miners. Luck, beyond the finding of the profitable lead, has had little to do with their good fortune, but it has resulted from attention to their business and studied economy. Many of the failures of six or eight years ago were due to the reckless style of operations and to extravagant management. The cost of many supplies was also very heavy and the profits made by dealers disproportionately large. As an instance, when quicksilver was selling at Boston for 80 cents a pound, \$1.50 was asked for it here in Halifax. Now, to make most

## MINES REPORT.

the gold mines open pay it is necessary to save in every department. The success of the tributers in mines that have been enabled to work profitably, shows what can be done by the effective employment of labor. Economy has also to be looked to in the management of supplies, and some experience of Mr. McClure is worth recording.

He required an indian-rubber belt 12 inches wide and 46 feet long. The price asked per foot here was \$1.10. Dissatisfied with the price obtained such a belt in Boston, which, duty and other expenses paid, he had him delivered here only 69 cents per foot.

Another instance is of sufficient interest to mention. Hitherto the single-tape fuse has alone been considered water-proof, and it sells at 15 cents per coil. Mr. McClure obtained some single tape from T. Bickford's manufactory in Connecticut which cost, expenses paid, 15 cents a coil, and it, he assures me, is water-proof. I am informed that lately single tape fuse has been sold in town at 15 cents a coil. The cost of drill steel is another large item of expense to gold miners. At the present price is some 15 cents a pound. It is hoped that when the Steel Company of Canada have their works fairly established, they may supply this material to the actual consumers at a much less cost.

Small quantities of powerful explosives, somewhat similar in their action to dynamite, have been imported for experimental purposes. We have heard of both mica powder and rend-rock being tried, but of their comparative advantages I am unable to write positively, no one being sufficiently experienced in their use to judge of their efficiency compared with dynamite. Mr. McClure, who has tried rend-rock, believes it is good for many purposes, as it can be used in wet ground. It is, however, more bulky than dynamite, but then it can be sold for 50 cents a pound, while dynamite costs 50 per cent more. The high price of dynamite militates largely against its extended use, and although its special advantages are well known, there is little doubt that the less cost of other high explosives bringing them into competition will restrict future sales in this country. The introduction of dynamite—first advocated in my report for 1872—has unquestionably done a great service to the gold miners, as it has enabled many mines to be kept open which could never have been worked with common black powder except at a loss. Possibly the agents of the British Dynamite Company may see their way to importing at a less rate than hitherto, and also get a concession from the Government by having it specially rated at a lower duty than 17½ per cent ad valorem. They inform me that the item of freight alone averages 15 cents a pound, and that notwithstanding the high price that dynamite commands, they have disposed of some thirty-five tons within the last three years. While on the subject of explosives, it may not be out of place to mention that the Acadia Powder Company are now manufacturing a new lasting powder that is rapidly winning its way into local favor. No preference will be found elsewhere to the business of this Company.

As the process of amalgamation in the battery and on copper plates is the only one practised in this Province, and as in parts of California another process is preferred, the following extracts from a paper on the practice at the Grass Valley Mills are reproduced as

possible interest to the gold miners and mill-men of this Province. The paper referred to was written by Mr. G. F. Deetken and published in Commissioner Raymond's report on the Mineral Resources West of the Rocky Mountains, 1873, and to which report those interested are referred for drawings and descriptions of the machinery employed.

#### TREATMENT OF GOLD-BEARING ORES IN CALIFORNIA.

The gold-bearing ores of California consist chiefly of quartz—in but a few instances of slates.

The gold is usually disseminated through the rock in small metallic particles, sometimes scarcely visible to the naked eye. Sulphides of iron, lead, copper, and zinc, and arseniurets, are frequently associated with the gold; but these rarely constitute more than 6 per cent. of the rock, and average, perhaps, only one per cent. Galena is considered the most favorable indication of the presence of gold in the quartz. Most of the gold contained in the sulphides appears to be in the metallic state, as the greater part can be separated by a grinding operation in a porcelain mortar, combined with a careful washing off of the slimes. To extract the gold from these ores, they are subjected at present to a mill process, which, with necessary machinery and apparatus, will be described in these pages.

The rock is generally delivered at the mill free from any large amount of waste. The small quantity left by the miner is thrown aside at the mill. It consists, according to the mineralogical character of the walls of the vein, chiefly of talcose, chloritic and clay slates, serpentine, diorite, and granitic rocks in general.

The treatment of the quartz comprises the following operations:

1. Crushing it by means of rock breaker and stamps, and amalgamating the freed gold, outside the battery, by various contrivances.
2. Concentrating the freed gold lost by these operations with the auriferous sulphurets.
3. Extracting the gold contained therein by chlorination or pan amalgamation.

#### I.—CRUSHING AND FIRST AMALGAMATION.

Previous to a final pulverization in stamp-mills, the quartz is broken to a small and somewhat uniform size by rock-breakers. (For a description of Blake's rock-breaker, see Mining Commissioner's report of 1870, page 648.) The jaws are usually set from 1 to 1½ inches apart, opening out to 1½ to 2 inches. The shoes are of white iron, cast in sand and slowly cooled. The rock-breaker discharges upon a platform in front of the feed side of the battery.

(The arrangement of the battery of a stamp-mill is then described and illustrated by plates.)

#### THE OPERATION OF THE MILL.

The rock is delivered from the mine in cars, containing each, say, 13 cubic feet, of a weight of 1,300 pounds, in front of the rock-breaker. At custom mills the quartz is delivered in wagons, the

crushing being paid by the load, consisting of about 35 cubic feet of quartz, and a weight of 3,500 pounds, including moisture.

The object of crushing being to liberate the fine particles of metallic gold disseminated through the quartz, so that they can be collected or caught by blankets and subsequently amalgamated; a fine crush is always desired. Fast crushing is not prejudicial to the saving of the gold in this process, the gold being leisurely collected and amalgamated, outside of the battery after crushing.

This is a distinguishing feature of the blanket-process as compared with the method of amalgamating in the battery while crushing, practised in Nova Scotia.

The rock-breaker, making 170 strokes of  $\frac{3}{4}$  of an inch a minute, is capable of a preparatory crushing of 72 tons of quartz, the crushing capacity of a heavy 30 stamp mill, in twenty-four hours. The work at the rock-breaker consists of ten hours, no night work being done. It increases the crushing capacity of a mill, on an average, 25 per cent.

Only the coarser quartz is passed through the breaker; the finer containing always a quantity of wooden splinters from the mill, which are crushed by itself in a separate battery. The splinters cause a loss of efficiency of the battery, by clogging up the screen holes. These require, in consequence, a greater amount of attention.

The feeding of the battery is done by hand, and is regulated so that there shall not be more than 2 inches of sands between die and shoe at the end of every drop. A good feeder knows to some extent the requirement of the battery by the clear or dull sound of the stamp stroke. The number of drops of the stamp per minute varies from 60 to 70, the lesser number corresponding to the heavier, the greater to the lighter stamps. The weight of the stamp varies between 600 and 850 lbs.; most frequently it is between 750 and 850 lbs. A battery of 20 stamps weighing 850 pounds per stamp, with 61 drops of 10 inches per minute, crushes 40 tons of quartz in twenty-four hours, with the aid of a rock-breaker, while a battery of 20 stamps weighing 700 pounds per stamp, with 68 drops of 10 inches per minute, crushes 35 tons of the same rock; a No. 6 screen being used in both trials.

The proportion of power necessary to do the work of the heavy stamps to that of the lighter stamps is as  $850 \times 61 : 700 \times 68$ , and the work expected therefrom would be as nearly 35 tons for the heavy, to 30 tons for the lighter stamps. But the former crush 40 tons, an additional quantity of over 5 tons in favor of the heavy stamps. When the rock-breaker is used in connection, the proportional result is nearly the same. The limit of weight has never been determined experimentally, though stamps are satisfactorily employed weighing over 900 pounds with a 10 inch drop. These results are on mill-rock of average hardness.

The quantity of battery water depends upon the amount of pyrites or black-iron sands in the quartz. It averages half a foot per minute to the stamp. It must be sufficiently large to keep the crushed sands over the blankets without allowing them to permanently settle upon them. Less grade to the blankets and more water is preferred to the reverse condition.

The bottom edge of the lower screen holes is 3 inches above

dies when new. The battery water during the crushing has a wave motion along the screens. The water has its natural temperature while passing through the battery and over the blankets. Further on, when passing through the rubbers and copper plates, it is warmed somewhat by the influx of hot water from the amalgamators.

After leaving the battery, the crushed sands are distributed by spouts on two sets of sluices covered with woolen blankets. There are three sets of blanket sluices for every 4 or 5 stamp battery. Each set consists of two sluices made of  $1\frac{1}{4}$  inch planed sugar-pine boards, one  $10\frac{1}{2}$  feet long, the other  $5\frac{1}{2}$  feet with a drop of 3 inches between them. They are from 16 to 17 inches wide, with sides of two inches in the clear, and have a grade of  $\frac{3}{4}$  inch to  $\frac{1}{2}$  inch to the foot.

The blanketing is manufactured for the mill trade, shorn on the lower side, with the nap on the upper. It weighs 8-10th. of a pound per running yard.

The upper sluice carries two strong blankets 21 inches wide and  $5\frac{1}{2}$  feet long each, the upper overlapping the lower about 6 inches. The lower sluice carries only one blanket.

The flow of the pulp is over two of the three sets of blankets, the third one being kept in reserve for use when washing the blankets of either of the others. The upper blankets which catch the bulk of the gold, are washed every twenty minutes, the lower one every two hours. The washing is performed in two tanks, used alternately. They are made of  $1\frac{1}{4}$  inch planed pine boards, and have a horizontal section of 3 by 4 feet, tapering towards the bottom. They are  $2\frac{1}{2}$  feet deep, and are provided with inclined shelves for the blankets and plug holes for the discharge of water after the settling of the blanket washings. The water used in these tanks is warmed in a heater by the waste steam.

The quantity of crushed sands passing over the blankets sluices of a 5 stamp battery is 12 tons in twenty-four hours, while the blanket washings, consisting of gold, sulphurets, iron and quartz sands, vary considerably in weight with the percentage of the metallic contents of the rock. The average quantity of dry blanket washings may be estimated at  $12\frac{1}{2}$  per cent. of the rock crushed. They are introduced by the blanket washer into a box in front of the amalgamators, from which they are swept gradually into the same by a current of clean, heated water of a temperature of from  $100^{\circ}$  to  $130^{\circ}$  Fahr.

The Atwood amalgamator, which is used, consists of two hollow cylindrical troughs, 17 inches long and 4 or 5 inches deep, of wood or iron, which are filled with pure quicksilver, over which the blanket washings are directed. The gold being specifically heavier than the quicksilver, will sink to the bottom, with the exception of that part which is attached to the quartz or sulphuret, and is, consequently, buoyed up.

The floating skimmings are agitated by wooden cylinders of 8 inches diameter, suspended parallel to and over the centre line of the trough, and provided with radial arms of  $\frac{1}{4}$  inch round iron, the ends of which are slightly curved. These arms are set along the cylinders in 12 longitudinal rows, containing alternately 8 and 9 arms, those of each row being set opposite the spaces in the next. They are not allowed to dip into the quicksilver, but almost touch it. The cylin-



at the same time to be caught on the amalgamated copper plates of the rubber.

The Eureka rubber consists of a rectangular cast iron box 7 inches deep and 4 feet 8 inches square, provided with a false bottom of cast iron dies or plates, on which cast iron shoes, fastened to a wooden frame receive a reciprocating motion by rods connected with an eccentric. The wooden shoe boards are covered with amalgamated copper plates. \* \* \* \* The number of revolutions of the eccentric shaft is 55 per minute. The length of stroke of the rubber frame is 4 inches. There is one Eureka rubber to every battery of 4 or 5 stamps. After passing the rubber the sands flow over amalgamated copper plates. These plates  $2\frac{1}{2}$  feet wide, of soft copper and heavy material, are laid in wooden sluices which have a grade of  $\frac{1}{2}$  inch to the foot. The sides of the sluices are 3 inches high. They are from 20 to 30 feet long. Three inches per stamp is the usual width of the copper plate sluices. \* \* \* \*

#### WORKMEN IN THE MILL, &c.

The labor of attending to the crushing and amalgamating machinery is divided in the following manner:—

One man at the rock-breaker is expected to handle 25 tons of rock in a 10 hour shift. He also removes the greater part of the waste-rock, amounting on an average to 3 per cent. of the rock delivered.

For every three 5 stamp batteries one feeder is employed, who handles in an 8 hour shift 12 tons of quartz, and also throws out all the wood and waste rock left by the hand at the rock-breaker.

The hand attending to the washing of the blankets also regulates the quantity of water passing over the blankets, watches the proper discharge of the sieves and feeds the blanket-washings to the amalgamators, while he regulates the flow of water through them. One blanket-washer attends to the blanket washings of three 5-stamp batteries.

The attendance upon the amalgamating machinery devolves upon the amalgamator who also prepares the screens, attends to the cleaning of worn-out shoes and dies, and various minor duties in the retorting and melting department. \* \* \*

#### NOTES.

A mill requires 130 pounds of quicksilver per stamp. The monthly loss of mercury is  $1\frac{1}{2}$  per cent., or 1 lb. for every 31 tons of rock crushed.

The monthly wear of blankets is  $1\frac{1}{2}$  yards to the stamp.

A 5 stamp battery requires on an average 13 sets of screens a year.

A set consists of five sheets of from 1 to  $1\frac{1}{2}$  square feet.

To run a 30 stamp steam mill requires from 32 to 36 inches of water, (miner's measure,) i. e., the discharge of an aperture of 32 to 36 square inches under a 6 inch pressure measured from the centre of the aperture.

A shoe lasts from 21 to 43 days, on an average 33 days, crushing 79 tons of rock. Wear  $1\frac{1}{2}$  lbs of iron per ton of rock.

The die lasts on an average seven weeks, crushing 100 tons. We use 3-10 lb. of iron per ton of rock. \* \* \*

The expense of crushing, &c., one ton of quartz in a 30 stamp steam mill, stamps weighing 850 lbs. each, with 61 drops of 10 inch crushing capacity, 72 tons per day, is on a full average \$2.04 per ton.

The full cost of milling one ton of rock \$2.04 includes steam power, labor, management, repairing, supplies, rent, interest, insurance, &c., but does not include the expense of concentrating the tailings and chlorinating the concentrates.

Steam power—Fuel and Engineers.....	\$ 0.51
Labor—Feeding, Blanket Washing & Amalgamating..	.65
Management .....	.12
Repairing .....	.02
Supplies .....	.17
Rents, Interest, Insurance, &c.....	.57
	<hr/>
	\$2.04

In a smaller mill the expense is higher. When water is the motive power a reduction of 80 per cent. can be calculated on the expense of steam power; 20 per cent. of the expense remains for the heating of the water for the amalgamators. This calculation is based on the supposition that the cost of engines and boilers is the same as that of the water rights, dams, flume, and water wheel.

#### CLEANING UP OF THE MILL.

All the amalgamating contrivances are cleaned up every Saturday while the battery gold is removed every few weeks on Sunday, which day the mill is stopped and repaired. After removing the skimmings floating on the quicksilver baths of the amalgamators, the quicksilver is scooped out of the trough into a bucket and the amalgam taken up. The amalgam forms a layer in the bottom of the trough. The upper trough contains 95 per cent. of the amalgam of the apparatus. In order to clean the amalgam of impurities, principally consisting of sulphides of iron, copper and lead, precipitated with the sinking gold, it is worked by hand in a bath of quicksilver. The small lumps of amalgam are broken, and the impurities floating on the quicksilver removed with a cloth. After a thorough cleaning the quicksilver charged with amalgam is pressed through a strong thick piece of canvas, and the remaining amalgam formed into balls of about 2½ inches diameter, weighing about 35 ounces each.

The quantity of mercury in the trough of one amalgamator, is about 700 pounds.

The riffles are cleaned in a similar manner. The amalgam is removed by passing a small scoop slowly close to the bottom, allowing the mercury to escape on the sides. The skimmings from the surface of the riffles are added to those of the amalgamators and treated in the pan. The amalgam on the copper plates is removed by means of a dull chisel. This operation has to be carefully performed, so as not to expose the copper. When the amalgam is removed, quicksilver



is sprinkled on the plates and spread by means of a piece of rubber belting, and the bright mercurial surface is finally washed with water.

The amalgam from the copper plates is freed from impurities by rubbing it in an iron mortar with an addition of quicksilver, while a current of water flowing in and out of the mortar removes the impurities. The washings are subsequently treated in the amalgamating pan with the skimmings.

The gold taken from the riffles is freed from accompanying iron and sand by the magnet and by panning and is added to the amalgam.

Before old shoes and dies are returned to the foundry they are overhauled for gold which is frequently found in the crevices.

The amalgam is then heated in a retort which is kept at a cherry red heat for two hours. The time taken up in retorting varies with the quantity of amalgam from four to six hours, starting with a cold furnace. When cool, the porous gold is melted in a blacklead crucible. The fluxes used are chiefly carbonate of soda, a little borax, saltpetre and sand. No matte is formed. The loss in melting is from 1 to 1½ per cent.

#### RESULTS OF THE MILL PROCESS.

The gold from the battery varies from 10 to 20 per cent. of the amount realized by milling. The longer the run, without a clean up of the battery, the smaller will be the proportionate result of the battery gold.

Of the whole amount realized from the sands, after leaving the battery, the mercury baths yield 65½ per cent.; the skimmings from the baths and riffles treated in pans, yield 26 per cent.; the riffles yield 2 per cent.; the rubber yields 4½ per cent.; the copper plates yield 2 per cent.

The concentrates yield from 5 to 10 per cent. of the gross yield of bullion.

#### CONCENTRATION OF THE MILL SANDS.

The sands after leaving the copper plates of the mill are subjected to concentration, the object of which is to collect the lost freed gold with the auriferous sulphurets to be treated by a subsequent process. The concentration consists of the following operations:—

1. Sizing the sands by means of pointed boxes.
2. Concentrating the pointed box sands in sluices with self-raising gate or riffles.
3. Subjecting the concentrated sluice sands to a further concentration in rockers, buddles, Hendy's concentrators, &c.
4. Treating the buddle concentrates by a more perfect cleaning operation in a tossing tub.

The concentrated sulphurets or arseniurets are subjected to a treatment by chlorine gas, after a thorough oxidizing or chloridizing roasting. The expense of the process, where the facilities are equal to working three tons a day, are \$4.87 per ton for roasting, \$2.21 per ton for chlorination proper, and for chemicals, management, &c., \$4.00, in all at a full cost of \$11.10 per ton.



## SHERBROOKE.

The yield of this leading district though 642 ounces under that of the previous year still represents nearly half of the total produce of the Province.

In the principal mine, the Wellington, both overhand and underhand stopes have been worked to the westward of the shaft to a distance of 228 feet. One of the underhand stopes is 90 ft. to the deep of the sump. The lead maintains an average size of 18 in. though swelling up in places to 2 ft. in thickness, an unusual size for a paying lead in this Province. The overhand stopes yield from 5 to 7 dwts., and the underhand about 18 dwts. to the ton.

The closely overlying lead, the Dewar, still continues to yield a fair average and to present the alternate rich and poor horizontal streaks, which by their wonderful regularity have made this lead remarkable. The pumping shaft on the Dewar has now attained a depth of over 380 ft. The stopes from it extend to the west in two lifts, one of 100 and the other of 30 ft., and to the east to the line of the Rockville property.

On the Grapevine property, Mr. Zwickl worked the McClure lead on areas 614 and 615 B. III. and took down stopes of 170 ft. to a depth of 130 ft. But at that depth it no longer paid as it ran down from 4 ounces to 7 dwt. to the ton and is only  $1\frac{1}{2}$  inches in thickness. The middle lead, 40 ft. to the south of the McClure on the same areas was worked on a stope 150 ft. long to a depth of 74 ft., and it thinned from 3 in. down to 1 inch in thickness. Mr. Zwickl then opened a lead 40 ft. still further south, which was known as the Big lead, for it is  $1\frac{1}{4}$  in. thick. The surface quartz yielded 5 dwt., at a depth of 40 ft.  $7\frac{1}{4}$  dwts. were realized, and on extending the workings the yield further improved and has since given handsome returns; so much so as to induce others to work on its extension on areas 616 and 617.

On the Alexander property Mr. McEachren and his party opened a 4 inch lead which is supposed to be the Murray and is in a line with the Dewar. The workings are next a break which going west throws the lead 4 ft. to the north. A stope of 20 ft. widened out to 60 ft. at a depth of 40 ft. shows the lead to have a number of rich strings of quartz coming in on the foot wall though the bed of slate from 8 to 15 inches thick. So rich were these strings that the "sights" collected in a powder keg yielded 7 ounces of gold.

On the south side of the anticlinal various leads have been worked in a small way on the Palmerston, Dominion, and Chicago properties. On the latter named property the Stryker lead was worked until the spring, and then the lead lying immediately north was re-opened more to the east of where it had been worked the previous year. The former workings had stopped against a fault which threw the lead 9 ft. to the north. The trouble was met by sinking a vertical shaft and taking the continuation of the lead 40 ft. down.

## TANGIER.

The produce of this district was smaller than it has been for ten years. Nearly a third of it came from Mooseland where the Irving

## MINES REPORT.

---

was worked. On which lead a stope was taken down to a length of 65 ft. west of a pinch, 25 ft. wide in the lead, which included the previous years' operations. Late in the year the majority of tributaries who have of late years continuously worked the district, abandoned the Irving lead for the present while they continue mining Cumminger lead.

On Strawberry Hill Mr. Forrest did a little mining in the M. areas 233 and 234, and some prospecting was done, on the north of the spot where the nuggets were found in 1869. Barton, who cut a trench and tunnel along the bed rock into the outcrop of several leads. But the only mining of any consequence was by Mr. Townsend, on the Forrest lead, on which an engine was erected late in the previous year to pump as well as hoist, and during the dry seasons, the extent of the old surface workings was much water to find its way in. The main shaft was sunk to a depth of 115 ft., and stopes opened east to a distance of 20 ft.

The lead is about 3 inches thick and in working is left as a hanging wall. Most unfortunately early in August when the mine was in fair working shape, the engine house was burnt down and the machinery destroyed. It has not since been restored.

### CARIBOU.

This district received more attention than it has done for many years, and the yield was larger than it has been since 1869. Mr. Grey and Lawson erected by the side of the Hyde lead on area 629, a right stamp mill, the engine of which also drives the pump. The main shaft is down 180 ft. and the stopes extend to a distance of benches 340 ft. to the westward. The dip of the lead is 45° and it varies from 3 to 8 inches in thickness. On area 629, a western extension of the lead, a stope of 20 ft. was taken down to a depth of 75 ft.

Mr. Touquoy returned to this district and prospected in the M. areas of his property. One lead he opened 3 in. thick, which yields about 1 oz. to the ton could not be profitably worked as the dip there is as flat as 45°, which largely increases the expense of working on account of the quantity of rock to be removed to the mill.

Much interest was taken late in the year in a new discovery to the north of the Hyde lead on area 629, Block II. The lead is 1 ft. thick yields 2 oz. to the ton, a very handsome return for that thickness. It has been opened by a stope 25 ft. long on two shafts, now some 40 ft. deep. On the adjoining area 630 a produce of 22 tons was only 10 dwt. The specimens from this area are finer and more numerous than were ever before seen in the district.

### MONTAGU.

Mining on the cross lead was early in the year abandoned. The shaft attained a depth of 216 ft. The stope worked had a length of 5 ft. The lead was reported to have pinched very thin at the bottom, but as the last stoping looked somewhat better, another

tributers late in the year reset the pumps and prepared to reopen the mine.

Some gold was obtained by tributers from the outcrop of the Belt lead on Messrs. Lawson's property, and the extension of the lead was taken at a 25 per cent. tribute, but soon abandoned. A little prospecting was also done on several other areas, but the total yield of the district was under 150 ounces.

#### WAVERLEY.

Work on the Barrel lead, area 156, was continued until the autumn. The lead lying almost flat was worked long wall, the loose rock being stowed tight to the roof, behind the miners. A little work was also done on 127 and other areas on Laidlaw's Hill.

The chief operations, however, were on the Union lead, areas 169 and 170. The main shaft is now 208 ft. deep. At a depth of 110 ft. the tunnel driven 78 ft., has been extended 36 ft. more. It terminates against a strongly marked fault.

The stopes to the west stop 14 ft. short of the boundary, to prevent the water in the old workings to the west finding its way into these deeper workings. The lead is about 8 in. thick with rolls and stringers from the foot wall.

On the underlying Dominion lead, the main shaft is down 128 ft. The second shaft about 160 ft. east of it, on area 190, is now being sunk. At a depth of 28 ft. stopes were opened out to the east and west 15 ft. each. This lead varies from 12 in. to 28 in., with an average thickness of 18 inches. It carries a small quantity of gold, from 2 to 7 dwt., but the finding a small pocket of richer quartz, induced the continued and extended work.

Prospecting was conducted by Mr. Huff, area 303, by a trench 16 ft. deep, partly in the solid rock, for a distance of 110 ft. without exposing any promising leads.

On American Hill a shaft has been put down on a lead dipping N. at an angle of 60°. It starts 30 ft. north of the Graham lead, which an incline from the shaft at a depth of 60 ft. is expected shortly to cut as the Graham lead dips at the flat angle of 43°. The Graham was said to pay well when opened some years ago, but it was worked from the edge of the pond downwards into the hill in such a way that the water of the pond was let in, and further working from the surface prevented. By opening it in the manner described, a cover will be left overhead to keep out the water and the lead tested in depth.

Mr. McClure recognizes the advantages connected with keeping surface water out by leaving untouched the outcrops of leads; while, unfortunately, many holders of gold areas are so indifferent to their true interests as to allow tributers to strip the surface in all directions and so interfere with and cause constant additional expense in any future legitimate mining of their property.

#### GAY'S RIVER.

The excavations in the carboniferous conglomerate lying in immediate contact with the gold bearing slates in areas 4 and 26 of this district were systematically continued.

A run or deprission in the slates was followed for 500 ft. of dip, until it abruptly ended against a face of slate. A second run, lying parallel but to the west and rise of the first, likewise ended abruptly. Operations were then resumed to the rise. In the autumn an opening was made on area 5.

On the opposite side of the brook, Mr. Corbett followed for 100 feet the dip of the bed-rock to the east, close to the side of the mill dam. Being without machinery, his operations are much troubled by water. The gold in the conglomerate is extracted by mortaring and panning the selected stuff; it is probable that much of the unobtained gold is thus lost.

#### CHEZZETCOOK.

In the autumn, a lead that had been worked some 10 years ago was reopened, and a sample crushed at the Lawrencetown mill gave 6 ounces to the ton. The lead is from 2 to 4 inches thick, and with an average would probably pay. At present the distance from Crooks', 13 miles off, is the nearest, is much against the interest of operation in this locality.

#### LAWRENCETOWN.

Mr. Crooks worked during the winter and following autumn the Cross lead, area 294, which runs southerly into what is known as Crooks' lead. The mine is by the road side, near the lower end of Crooks' lead was the first opened in this district. On the Cross lead, which is 18 in. wide, a length of 40 ft. was stoped to a depth of 10 ft. the old pit on the Crook's lead being used as a sump. Pumping was effected by means of a light 1 in. wire rope, which conveyed from the crushing mill 100 yards away. The mill originally belonged to the Westminster Company, and was removed to its present position on the side of the saw mill, that it also might be driven by the water wheel. Prospecting on a small scale was done in other parts of the district. Late returns show that the Cross lead has been paying from 1 to 3 ounces a ton.

#### OLDHAM.

Owing to the transfer, of what has been known as Donnelly's property, to Mr. McClure and his associates, mining on areas 131 and 132 was temporarily suspended. In the autumn it was resumed as the machinery had been thoroughly refitted and in part renewed. Profits of the first six weeks' operations were consumed in paying for the extensive alterations and repairs. Hitherto the mine has been much troubled with water, and, after heavy rains, mining has been forcibly suspended. To guard against inundations a thorough surface draining has been effected, yet the fault still carries a large deal of water into the mine, though not enough to overpower the present pump, even when 5½ in. of rain fell in one week. The pump used is one of Cameron's direct acting steam pumps, but its consumption of steam, and consequently of fuel, is so great that it is regarded as anything but economical; fuel being an item of much consideration. The pump shaft has now a total depth of over 200 feet.

working stopes extend westwardly. It is intended to sink to the east, and catch the water which now finds its way so freely into the mine by the fault, and so relieve the deep workings.

The Wallace lead, areas 337, 339 and 341, has been taken down to a depth of 50 to 60 ft. In sinking, the lead was found to thicken from 5 to 30 inches in a roll, about 14 ft. long and dipped east  $20^{\circ}$ , it was crossed by a similar roll dipping west. Below the roll the quartz gave  $2\frac{1}{2}$  oz. to the ton.

The Frankfort lead, areas 321 and 322, was worked until June and then abandoned. The gold streak dipping east was followed down and the east stope next the road was sunk to a depth of 190 ft. The next going west, to a depth of 170, and the third abandoned at a depth of 140 ft. The lead was reported to have thinned to 2 in. Although the last crushings gave  $1\frac{1}{2}$  to nearly 3 oz. to the ton, the lead was said not to pay.

Some further work was done on the Angling lead, area 533, which lead was described in the last report. The dump pile at the mine was washed and picked over, and yielded 10 oz. of gold.

On areas 101 to 105, the Blackie lead was stripped and stopes taken down to various depths in search for nodules of arsenical pyrites, which were found to carry gold to the extent of several ounces, and up to 5 or even 7 ounces. The gold in this lead seems to be mostly aggregated in nodules of pyrites. The old shafts on the Blackie lead, area 106, were also reopened.

The yield of the whole district was larger than it has been since 1870, and within 100 oz. of the yield of that year.

#### UNIACKE.

More men than of late has been usual worked as tributers in this district. The greater part of the gold obtained was extracted by Messrs. Hogan and Barsalou from area 780, Block II.

In the cross tunnel, on the property of the Montreal Mining Association, mentioned in late reports, and which was driven 150 ft. south from the old lead; at a distance in the tunnel of 50 ft. from the old lead, the cross tunnel lead was cut. This lead did not show on the surface; it has lately been reopened by Mr. McClure and a shaft pierced to the surface and continued downwards some 60 ft. below the tunnel, giving it a total depth of 170 ft. The total thickness of this lead is 2 ft. 6 in., but only one foot of it contained an appreciable amount of gold. The solid quartz on one side of the lead being barren, while the stamping stuff on the other side is the curllly slate streaked with strings of quartz carrying gold. The operations on this lead have been abandoned as unprofitable.

While testing this lead, Mr. McClure put up new and substantial machinery on the old lead and repaired the mill, instigated by a knowledge of the previous operations and by the record of the last crushing in 1870, when 39 tons yielded 56 ounces of gold. In the original pumping shaft, 220 ft. deep, the pay streak was found dipping east, and had been passed through in the bottom. It is now intended to sink a shaft to the east, to strike if possible the streak in depth. The miners who last worked in the eastern stopes believe that the

indications were favorable to an extension of the streak. It varies from 4 to 10 in., with an average thickness of 8 in.

The work of repairing the old lead's most easterly surface has been much hindered by the operations of tributers in la who by taking the outcrop left as a roof to the workings, the old timbers and debris of their mining (?) down the shaft letting in the surface water, have occasioned at least \$1,000 expense.

Mr. McClure describes the practice of allowing tributers the surface, as "ruinous" to the future interests of the gold and justly so in the case of proved properties. Tributers are ever, a useful class of men, if only their operations are duly controlled and when they are not, the fault lies not with them, but with the lessees of the areas, who allow them to work with their temporary interests only in view. For all the evidence on the question of depth to which gold may be found, points to the fallaciousness of the theory that the deposits impoverish in depth.

In this district some of the excavations in which tributers are seen working, are in places as narrow as 14 in., with no greater than 18 in. for a considerable distance. The narrow leads are more persistent and some have been traced for half a mile while the thick leads are as "spews" which soon thin out. In spots 20 ft. wide, and a belt of leads 25 ft. wide thins out to but a string of quartz  $\frac{1}{4}$  in. wide. Other leads 15 in. thick most pinch out for a few feet, and beyond swell out again.

#### RENFREW.

The yield of gold from this district has been but nominal for years. During the current year something better may be expected the extension of the Ophir on Mr. R. G. Fraser's property taken by a company and preparations made for working it. The shaft has already been pumped out and repaired.

#### OTHER DISTRICTS.

At Indian Path, Ovens district, a little work was done, and tons of quartz yielded  $3\frac{1}{2}$  ounces of gold.

A new district was laid off at Moose River, lying to the north of Mooseland and west of Caribou, and from sights obtained in prospecting, miners are in hopes of finding a workable lead.

At Fifteen Mile Stream the returns show that only a small amount of gold was there extracted.



## IRON.

The Steel Company of Canada made a return to the effect that they mined 15,274 tons of iron ore in 1876, and employed, on an average, 72 miners and 87 mechanics, laborers and boys about their several mines at Londonderry, irrespective of those engaged about their furnaces and steel works. Mining operations are now somewhat reduced since the exploitation is so much in advance of present requirements. A sample of the yellow ochre, which is abundant in parts of the Londonderry deposits, was sent to England and readily sold. This ochre has a good dark red color when burnt, and should supply the local market.

In the spring the charcoal furnace was blown out, and as the completion of the coke blast furnaces was delayed until late in the year, little metal was made. Some 300 tons of ore were exported to England via St. John and most favorably reported on. Several lots of charcoal pig were also shipped from the same port at the low rate of 50 cents a ton freight.

Experiments in coking the various available coals of Pictou and Spring Hill received the attention of the Company, and they believing it to be most economical to make coke at their own works, have erected 25 coke ovens to supplement the supply furnished by the Halifax Company (Limited).

Explorations were nowhere very actively conducted during the past year. The only important discovery to be noticed was made at East Bay, Cape Breton, on Lauchlin Currie's farm, some 15 miles from Sydney. The district has been covered by a license to search taken out by Mr. Moseley. The prospecting done on the farm in question has exposed a vein of red hæmatite in a bed of crystalline limestone of Silurian age. The vein varies in the exposures seen from 5 to 9 ft. in thickness, its course is about W.S.W., and the ground is about 400 ft. above the waters of the Bay. According to the statements of the people of the district, the surface indications point to the existence of more than one vein and to a probable extension of the series for some 6 miles from French Vale to Thomson's brook, and even, perhaps, to Escasoni. No analysis of the ore has yet been made.

### IRON DEPOSITS OF THE EAST RIVER, PICTOU COUNTY.

Mr. Gilpin reports that four areas, rights to work numbers 20, 21 and 22, and lease No. 33, were carefully surveyed and their corners marked by stone posts. A complete survey for a branch railway to all the chief deposits confirmed the route selected by him two years before.

Further operations were made; the vein of specular ore on the west side of the East River was traced for three quarters of a mile, and opened near the west side of area No. 22. It was there found to be 7 ft. wide and of good quality. Indications were traced of the

passage of a 5 ft. bed of red hæmatite across area No. 37 and i 36. Other explorations indicate the eastwardly extension of the Blanchard bed of red hæmatite.

At Sutherland's River indications of spathic ore were found a mile east of the openings already made.

Beds of clay-ironstone are reported to have been discovered on the French River. They are said to be numerous and to vary in thickness from 6 inches to 4 ft. An assay gave 35 per cent. of iron.

#### IRON ORE ANALYSES.

A table of twenty-nine analyses of iron ores was published in the annual report for 1874; in the present report will be found two other analyses.

Numbers I. and II. are ores from areas adjoining those of Messrs. Wright and Gisborne, at Whycocomagh, Cape Breton. They were made by Professor How of King's College, Windsor. Nos. III., IV., V. showed traces of titanium and manganese. Nos. III., IV., V. are of samples from Messrs. Wright and Gisborne's areas. Analysis VI. was made by Dr. Hayes of Boston, and shows no phosphorus. Nos. III., IV. and V., made by Dr. Noad of St. George's Hospital, London, show such large quantities that a negotiation for the transfer of the property was in consequence broken off.

Copies of Dr. Noad's analyses were kindly furnished to Messrs. Wright and Gisborne. The analysis of the limonite from Brookfield, Colchester County, was made at the Cambria Iron Works, Penna, so Mr. Wright, who contemplates developing the property in the spring, informed me. Another analysis of the same ore showed a still less per cent. of phosphorus, .017, which is very favorable to the character of the ore.

The other analyses in the table, VII., VIII., X., XI. and XII. were made by Dr. How of King's College. The first two of these were made from ore found in the trap of North Mountain, Annapolis County; No. VII. is the ore at Arisaig Pier, spoken of in the report for 1874, and No. VIII. and XII. of brown iron ore, similar in appearance to that from Martins brook, Londonderry, from the Goshen hills of Hants. The analysis of this ore was published in the report for 1874, which showed a large percentage of manganese, but which further examination proved to be abnormal. The quantity actually contained, according to Professor How's analysis, being about the same as that in the ore of the Steel Company of Canada.

Professor How also kindly examined a specimen specially sent to him by myself from among those of the latter, and found that the encrusting fibrous mineral which attracted attention was made of iron. It was from Martin's brook mines.

The analyses of the Londonderry ankerites were made by Professor Chapman of Toronto, who states that the minerals submitted to him were mixtures of Ankerite proper, with the closest related minerals, spathic iron ore, dolomite and calcite—the ankerite greatly predominating.

STATISTICS relating to the iron and steel importations into the Dominion were published in the report for 1875, and no later information is yet obtainable.

## IRON ORES OF THE STEEL COMPANY OF CANADA

COMPONENTS.	Martin's Brook Kidney Ore fibrous botryoidal, Brown Hematite, sp. gr. 3.88.	Martin's Brook ochreous Brown Ore, sp. gr. 3.67.	Martin's Brook Specular, very acaly structure, sp. gr. 4.48.	Martin's Brook earthy looking Brown Ore, sp. gr. 2.13.	Folly Mountain Brown Ore, sp. gr. 3.63.	COMPONENTS.	Furnace Quarry Ankerite, white but streaked, sp. gr. 2.99.	Furnace Quarry Ankerite, pale brown, compact, sp. gr. 3.004.	Martin's Brook Ankerite, brownish white, sp. gr. 2.995.	Folly Mountain Ankerite, white, sp. gr. 2.98.
Sexquioxide of Iron.....	82.52	.....	98.52	83.17	77.78	Carbonate of Lime.....	52.12	48.02	49.08	50.86
Oxide of Manganese.....	.84	.....	.16	1.04	1.17	Carbonate of Magnesia...	23.14	26.12	25.80	24.83
Alumina.....	.38	.....	.24	.42	.21	Carbonate of Manganese.	.96	1.08	.87	.72
Magnesia.....	.14	.....	.27	.15	.12	Carbonate of Iron .....	23.71	24.67	24.23	22.90
Lime.....	.16	.....	.08	.13	.20	Silica.....	.04	.06	.04	.63
Phosphoric acid.....	.22	.....	trace	.29	.27	Total.....	99.97	99.95	100.03	99.94
Sulphuric acid.....	.04	.....	trace	.02	.03					
Silica.....	2.28	.....	.66	4.12	6.93					
Water.....	13.36	.....	.....	10.67	13.33					
Total.....	99.94	.....	99.93	99.91	100.03					
Metallic Iron.....	57.76	58.87	68.96	58.22	54.44	Metallic Iron.....	11.44	11.90	11.69	11.05
Phosphorus.....	.096	.105	.....	.126	.118	Magnesia.....	11.02	12.44	12.28	11.82
Sulphur.....	.016	.024	.....	trace	trace.	Lime.....	29.18	26.90	27.29	28.48
Titanium.....	.000	.000	.....	.....	.....					

IRON ORES.	WHYCOMAGE, CAPE BRETON.						NORTH MOUNTAIN, ANAPOLIS.		Ilmonite, from Brookfield.	Red Hematite, Arisaig Pier.	Ilmonite, Goshen, No. 1.	Ilmonite, Goshen, No. 2.
	Hematite (R. G. Fraser).	Magnetite (R. G. Fraser).	Hematite No. 1 (F. N. Gishorne).	Hematite No. 2 (F. N. Gishorne).	Hematite No. 3 (F. N. Gishorne).	Hematite (A. Wright).	Magnetite (Roman's).	Magnetite (Tremblay).				
Oxides of Iron.....	80.13	63.74	80.00	85.70	52.40	84.20	93.27	90.22	.....	74.77	.....	.....
" " Manganese.....	.....	.....	.40	.20	.....	.....	.....	.....	.....	trace	.55	1.11
Alumina.....	5.85	5.52	.....	.....	.....	1.40	.....	.....	.....	.....	.....	.....
Magnesia.....	2.49	3.12	2.75	2.40	3.32	1.64	1.27	4.84	.....	8.76	.....	.....
Lime.....	.....	.....	.....	.....	.....	1.85	.....	.....	.....	.....	.....	.....
Phosphoric acid.....	trace.	trace	1.00	3.56	1.503	.....	.....	.....	.....	.....	.08	.08
(Phosphorus).....	.....	.....	.....	.....	.....	.....	.....	.....	.023	.37	(.035)	(.035)
Sulphuric acid.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(Sulphur).....	.14	.51	.00	.00	.00	.11	.....	.....	.....	.....	.....	.....
Silica.....	10.04	24.34	14.80	6.00	42.80	10.80	5.46	4.94	.....	trace	17.82	19.59
Water.....	1.29	2.77	.....	2.00	.....	.....	.....	.....	.....	16.10	10.98	9.73
	99.84	100.00	99.85	99.86	100.02	100.00	100.00	100.00	.....	100.00	.....	.....
Metallic Iron.....	56.00	46.16	57.20	60.00	36.67	60.90	68.33	65.03	58.95	52.34	45.69	50.79

---

The following extract from the Engineering and Mining Journal of New York may be of interest to prospectors of iron ores :—

"The great loss of economy in using poor ores does not seem to be generally appreciated, but it is very plainly shown in the paper by E. S. Moffatt on the "Comparative Value of Iron Ores." According to that paper, the experience of Port Oram Furnace, using New Jersey magnetites, shows that if a 60 per cent. ore is worth \$5.50 per ton, to give the same cost of a ton of pig iron, a 55 per cent. ore should be worth only \$4.50; a 50 per cent. ore, \$3.53; a 45 per cent ore, \$2.63; and a 40 per cent. ore, \$1.81."

NOTE.—Mr. Wright states that the samples of Whycocomagh ore analyzed by Professors How and Hayes were from the eastern ravine, while Dr. Noad's analyses were from samples of a lot of 150 tons mined from the western ravine.

---

## LEAD.

---

At Caledonia, Guysboro' County, just below Smith's settlement, on the west bank of the river, two narrow converging veins carrying galena were discovered during the summer of 1875. On one of these veins a tunnel was driven in 120 ft. S. E., cutting the intersection of the two veins at a distance of 85 ft.

The vein averages only 1 inch in width, though it thickens in places to  $\frac{3}{4}$  inches. Beyond the intersection the galena diminished in quantity. Then returning to the mouth of the tunnel, a shaft was sunk 26 ft. and a stope from it is now being taken in on the vein with a better result, though present indications are not very encouraging. The owners, Mr. McClure and Zwickl, with true mining spirit, are determined to further test the district, and will prospect in other sections this year. Some 13,100 lbs. of very pure galena were extracted and 5 tons sent to England. An analysis of the ore was given last year.

In Cape Breton, on Smith's mountain, about 2 miles from the bridge over the North river that flows into St. Ann's Bay, a quartz vein has been traced for a mile or more, showing, it is said, in the intersections of the brooks. The vein has an east and west course and averages 5 inches in thickness. Where the principal opening was made, it showed some galena spotted with copper pyrites and zinc blende. A sample of 900 lbs. sent to the Institute of Technology, Boston, yielded at the rate of 501 lbs. of concentrated ore to the ton, and at the same rate, 155 lbs. ingot lead and 2.95 ounces of silver.

## COPPER.

Prospecting for copper was conducted in Antigonish County at Polson's and Lochaber lakes and towards Guysborough, at New Brunswick and at Cape d'Or.

At Polson's lake, the vein previously mentioned as discovered in 1875, has been opened by a shaft 25 ft. in the vein, and its thickness there proved to be about 6 ft. The mineral matter at the opening is chiefly spathic iron ore, yielding 35½ per cent. of iron; it is spotted with copper pyrites. At a distance of 150 ft. from the vein, where the cover is reduced from 20 to 5 ft. in thickness, another opening was made, and the width of the vein there determined to be 11 ft. The percentage of copper ore is said to have also increased.

Mr. Ross, of Pictou, writes that other explorations disclose other small veins in the same locality.

But the most important discoveries were made on the lots southerly of the lots on the 3rd range of the College lands, about 3 miles due west of the southern end of Lochaber lake.

Attention had been drawn two years before to the locality by the discovery of some boulders of quartz, &c., showing copper staining. A license to search was taken out. But as the spot where the boulders were was a swamp, nothing further was done. Mr. McBean and his associates exploring at Polson's lake, visited the locality and made some examinations. Taking the line of the boulders, which was found to be nearly the same as the strike of the rocks, a shaft was put down on it on a knoll 100 ft. distant, and, as luck had it, directed to a vein (numbered 5 in. in the following description of the locality).

On the vein the shaft was put down some 75 ft., and the vein matter extracted showed a great deal of solid copper pyrites associated with specular and spathic iron ores, calcite and quartz.

An analysis by Professor How of Windsor gave,—

Metallic copper.....	19.21
“ iron.....	25.31
Sulphur.....	22.63
Lime.....	5.15
Oxygen, &c.....	4.67
Gangue.....	23.01
	100.00

A picked sample of fine grained ore gave 31.9 per cent. of copper.

An assay of 7 cwt. at Swansea gave 19.87 per cent. of copper.

An average of three analyses gave Mr. Gilpin 29 per cent. of copper in picked samples.

Mr. Gilpin visited the property late in the year and when

explorations had been made, and from his report I extract the following memoranda:—

The ground is elevated about 450 ft. above the lake. The following veins have been proved in a radius of about 200 ft. and traced 100 to 300 ft.

No. 1. A three feet vein containing numerous pieces of copper pyrites crystallized and massive. Course N. 72 W.

No. 1. A. A four foot vein 6 ft. east of No. 2., which is three feet wide and holding much ore. It shows one band of ore 4 in. wide.

No. 3. Five to six feet wide with a shaft 86 ft. deep, showing 10 per cent. ore.

No. 4. Two feet wide with bands of ore up to 2 in. wide.

No. 5. A six ft. vein—already described.

No. 6. A vein three feet thick.

Veins 1. A. to 6 have a course about N. 30 W.

On the strike of No. 1, 300 yards to the east, other veins  $4\frac{1}{2}$  and  $1\frac{1}{2}$  ft. thick were exposed; and still further on the same strike, several veins from 2 ft. downwards in thickness have been laid bare.

#### CAPE D'OR.

Another attempt to find copper in workable quantity in the trap rocks of Cape d'Or was made by Mr. Prendergast. A tunnel was begun at Bennett's brook on a vein carrying quartz and zeolites impregnated with copper, adjoining a dike of trap breccia. A bed of more compact trap was also opened which carries native copper as plates in the crevices and finely disseminated throughout the mass associated with small amygdaloids. The quantity of copper contained seems to be about half of one per cent. Pieces of native copper have been from time to time found on the shore near the steam whistle at the point of the Cape, in masses of several pounds weight.

#### NEW ANNAN.

Explorations were renewed in this locality. Drifts were opened in the sandstone beds carrying nodules and shots of copper pyrites, with a view to testing the percentage contained. About 15 tons were reported as collected, of which quantity about 4 tons were sent to England for sale, but of their value no account has yet been received.





## GYPSUM.

The Collectors of Customs at the several undermentioned ports courteously supplied the following entries :—

Ports.	Tons.	Value.	Destination.
Antigonish.....	1,256	\$ 2,823	Quebec.
Baddeck.....	2,245	2,245	United States.
" .....	.....	.....	Quebec.
Cheverie.....	16,430	76,735	United States.
Hantsport.....	150		
Maitland.....	3,855		
Walton.....	685		
Windsor.....	55,615		
Pugwash.....	75	75	P. E. Island.
Wallace.....	529	444	Quebec.
" .....	80	56	P. E. Island.
	<u>80,920</u>	<u>\$82,378</u>	

From the Great Bras d'Or, C. B., probably 5,000 tons additional were shipped to Quebec. The exports from Windsor and its outports—bracketted together,—are according to the figures kindly given by Mr. O'Brien, of Windsor.

Among the appended tables will be found one showing the quantities and values of Gypsum imported into the provinces of Canada, from the United States, from 1870 to 1875.

The statement was obtained through Mr. Goudge, M. P., Hants. In the entries for 1871 the value of crude Gypsum is evidently incorrect.

*STATEMENT showing the Quantities and Values of all Gypsum and Plaster of Paris imported into Canada from the States, during the fiscal years 1870 to 1875.*

PROVINCES OF CANADA.	Crude Gypsum.		Ground not Calcined.		Ground and Calcined.		Total.
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
1870.	Barrels.	\$	Barrels.	\$	Barrels.	\$	Barrels.
Quebec.....	56	89	2	6	3	13	6
Ontario.....	38,109	12,054	13,949	11,951	1,614	2,113	53,672
Nova Scotia.....					91	184	91
New Brunswick.....			134	210	1,549	2,529	1,683
Total.....	38,165	12,143	14,085	12,167	3,257	4,839	65,507
1871.							
Quebec.....	7	15			4	6	11
Ontario.....	31,821	35,752	1,175	1,679	1,184	1,642	34,180
Nova Scotia.....			46	67	173	384	219
New Brunswick.....					1,002	1,586	1,002
Total.....	31,828	35,767	12,21	1,746	2,398	3,618	35,447
1872.							
Quebec.....					11	11	11
Ontario.....	34,572	10,716	8,711	7,974	1,057	1,480	44,340
Nova Scotia.....					132	220	132
New Brunswick.....					1,075	1,657	1,075
Total.....	34,572	10,716	8,711	7,974	2,275	3,368	45,555
1873.							
Quebec.....					1	3	1
Ontario.....	12,858	9,107	8,612	8,326	2,777	1,995	24,247
Nova Scotia.....					11	177	11
New Brunswick.....			11	37	1,887	2,994	1,908
Total.....	12,858	9,107	8,631	8,363	4,710	5,179	26,156
1874.							
Quebec.....					77	64	77
Ontario.....	37,106	20,526	1,239	1,641	4,745	5,738	43,090
Nova Scotia.....					181	111	181
New Brunswick.....	901	613			2,450	3,577	3,351
Total.....	38,007	21,139	1,239	1,641	7,453	9,827	46,690
1875.							
Quebec.....			121	57	129	266	250
Ontario.....	22,786	7,219	9,859	8,250	9,773	11,131	42,418
Nova Scotia.....					423	553	423
New Brunswick.....			265	277	2,781	3,287	3,046
Total.....	22,786	7,219	10,245	8,584	13,106	15,037	46,139

---

## BARYTES.

---

Much of the small quantity of Barytes mined at Five Islands is locally used in the manufacture of paints. It is sold in small lots by the country people to the Dolphin Manufacturing Company who no longer mine on their own account. And although the whole consumption of Barytes by the Company is only about 50 tons a year, they have lately had to import some Barytes to meet their requirements.

---

---

## HYDRAULIC CEMENT.

---

Mr. R. G. Fraser, Analytical Chemist, has taken out a patent for making Hydraulic Cement from talcose minerals, calcined and ground with lime. He believes that he has found at Whycocomagh, C. B., a talcose limestone admirably adapted for this purpose, and is now conducting experiments to test the value of his discovery.

---

---

## LIMESTONE.

---

The quantity entered in the General Summary as shipped, was sent from Pugwash to Prince Edward Island.

The Marble Mountain Quarries did nothing pending the repairs and enlargement of the St. Peter's Canal. Sample blocks of the white and various colored marbles sent from these quarries to the Centennial exhibition were much admired. The quarries were visited by Mr. Underhill, of West Rutland, Vermont, who wrote and spoke most favorably of the quality; a matter that can only be fairly judged by a practical worker in marble.

Of the extent of the deposits and the facilities for quarrying I can justly say nothing more could be desired. An abrupt hill of solid marble several hundred feet in height rises from the shore of the Bras d'Or Lake with deep water within 100 feet. A tunnel has been driven through the broken and weathered beds on the slope of the hill into a rent which, when cleared of the clay which now fills it, presents an extended face of marble unshaken by frost. The cleavage planes of

re wide apart and lie parallel to the mountain range, so that large blocks can economically be extracted, lowered by the tunnel and by a self-acting incline lowered to a mill and into slabs for shipment.

If the prohibitory duty of 50 cents a cubic foot closes the United States market, there should be no opening for the local demand on the re-opening of the St. Lawrence only the quality is suitable for the trade. The value of marble imported by Nova Scotia in 1875-6 was \$300,000.

## ACCIDENTS.

The year 1875 was exceptionally fortunate in the matter of collieries, not one having occasioned death underground or on the surface. The past year, 1876, saw three deaths at collieries, two underground from falls of coal, and one from the fall of a gin. Such a record compares favorably with former years, which tabulated appear as follows:

### FATAL ACCIDENTS AT COLLIERIES.

	Year 1876.	1875.	1874.	1873.
.....	3	2	7	73
per life lost..	236,548	390,582	124,674	14,403

	Year 1871.	1870.	1869.	1868.
.....	5	4	4	7
per life lost..	134,648	156,442	144,575	66,027

The marked increase in tonnage per life lost may fairly, in the absence of other evidence, be attributed to the improved discipline required by the new Chapter.

A perfect immunity is, of course, an impossibility. Accidents will happen even though men should cease to be careless.

In Great Britain, the highest average of tons of coal raised per life lost during the years 1874 and 1875 in any colliery was 61,796 tons, while the average of the whole country was 8,730 tons. And yet mining laws *in favorem vitæ* have been in force for over twenty years.

Discipline and divided responsibility are necessary in the management of large works, much divided responsibility causes the rules of the mining law to be more or less evaded. With your sanction negligence hitherto has been common. It appeared that it arose from inadvertence and when it has been promised for the future. In a general way given the same, still it is open to question whether advantage

not be taken of it in the future, and, a warning for non-compliance expected as a custom, before an action will be taken. That the law does not sanction this view should be thoroughly well understood, lest in gross cases of violation shelter might hereafter be taken under the plea that the practice was to give a warning of the first contravention.

One of the most noticeable features of the past year's record is the small number of accidents from gas explosions, so small indeed as to raise a doubt whether all that did occur were reported. The law which managers should remember expressly requires that "where \* \* any personal injury to any person employed in or about the mine occurs by reason of an explosion of gas, powder, or any steam boiler, \* \* the owners, agents or managers of the mine shall within twenty-four hours next after the explosion or accident send notice in writing &c., \* \* to the office of the Commissioner."

Accidents from other causes are required to be reported only when the injury is serious. The degree of severity entailing a report may be differently construed, but in a case of explosion there can be no question whether it should or need not be reported.

Two accidents happened at gold mines which were not reported, as the injury done was fortunately slight, though it might have been serious. Both were occasioned by the breaking away of ladders on which three men were in each case ascending. I have occasionally had to speak of the temporary nature of the ladder fastenings since they so easily may, by little neglect become insecure. The remedy is in the hands of the miners who have but to call attention to the mining law to have their complaints examined.

The chief cause of much of the temporary character of the gear about some of the gold mines is the system of working—absent owners letting their areas for short periods to tributers, who, having no permanent interest scrimp what work they can. This subject has been before mentioned as one of the evils of the tributing system, as it is often practiced, and it might be well if owners bore in mind the share of responsibility imposed on them by the Mines Regulation Chapter for the safe condition of the mines, when they make such agreements with tributers.

#### FATAL ACCIDENTS.

1. February 17th—Jean Baptiste Fosse, aged 37, leaving a wife and one child. Cause—a fall of coal.
2. April 16th.—Leonard Townsend, aged 33, leaving a wife and four children. Cause—fall of a gin.
2. April 28th.—Joseph Livingstone, aged 23, unmarried. Cause—a fall of coal.

#### EXPLOSIONS OF GAS.

The first reported occurred at the Cumberland Colliery on driving up the return airway by the side of the main slope. If any gas at all is given off from a coal seam it is sure to collect under such circumstances. In this case the man who caused the explosion was only slightly singed.

The second took place in the Queen pit, at Sydney Mines, where two men were injured, though not seriously, two plate-layers. It was indirectly caused by the strike, for during the two months that it lasted the water in the deep workings and disarranged the ventilation. It seemed that a capful of gas collected behind a canvas door at the top of a drift, and the slight explosion which took place happened when the door was put aside. This occurred within a few days after work was resumed, and before the air currents were all adapted to the new conditions.

The third explosion, of which notice was given, happened in the Vale pit. The time-keeper went into the face of a rise heading in a measurement stamp, and although the place is said to have been reported clear a few hours before, he fired some gas and burnt the face and hands.

#### EXPLOSION OF A STEAM-BOILER.

One was reported to have occurred at Spring Hill, August 1st, 1881, by the rupture of a flue, and to have injured a stranger passing by.

#### EXPLOSION OF POWDER.

But one instance of an explosion of powder occasioning injury in a mine has to be noted. While in the act of charging a hole with stone at the Victoria colliery, two miners were burnt, though not severely, by the premature explosion of the powder. One man lost his little finger.

Two men who ought to have known better, while prospecting at St. Anna, C. B., tried to unram a hole. They succeeded in firing the charge and burning their hands, but no more severely than they deserved.

#### FALLS OF COAL AND STONE.

Eleven casualties were reported as due to this most fruitful cause of accident, two of which unfortunately proved fatal. The first happened in the Vale pit, February 21st.; J. Baptiste Foss was endeavoring to pry down a block of coal which hung after a fall, and was crushed to death by the sudden giving way and fall of the block.

The second occurred in the Victoria pit, April 28th. Livingstone and his brother were working off the side coal in a drift cut. Trusting that the coal was solid, they bored a hole for a drift, and Joseph was in the act of holing underneath, when the coal fell down and crushed him. The line of fracture was the face of the coal, and those masses of stone often mentioned as peculiar to the R. Blockhouse seams.

At the Gowrie Colliery one man had his leg broken and his back injured by falls of coal.

At Sydney Mines one man had a leg broken by a fall of coal from the roof, another by the fall of a "pot" from the roof, and a third received such serious injuries of the spine by a fall of coal that his ultimate recovery is doubtful. The dislodgment of masses

coal, which a shot has failed to bring down, causes most of these accidents, for the rupture is often sudden and without warning.

In the Caledonia pit a man had his hip dislocated from the same cause, and another at the Joggins had his thigh broken by the falling of a block off the face of a "slip."

Other slight accidents were reported to have occurred at the Glace Bay, Blockhouse and Cumberland collieries.

#### IN SHAFTS.

The Department was notified of two accidents, the sufferers by which may fairly be classed among the fortunate.

Kenneth McKenzie, night foreman, entered a shaft house on the Dominion lead at Waverley without a light, and, misjudging his distance, stumbled into the shaft. Luckily, he fell on the slides on the foot-wall, and involuntarily clutched them with his elbows, and so his course was directed and the impetus of his fall somewhat checked. He fell nearly 100 feet and struck the spreader at the bottom. Although his injuries were severe, he had two ribs broken and a simple fracture of one leg, his nerve was so great he pulled himself up the ladders to the surface.

In September, when helping to put in the column of pipes in the Sterling shaft at Glace Bay, P. Bryan fell from his boatswain's chair into the sump, a distance of 95 feet, and yet had the good fortune to escape with only a broken arm.

In the Wellington gold mine, Sherbrooke, a man had his arm and thigh broken by the fall of a plank from a tub going up the shaft while he was on the ladders. The General Rule of the Mines Regulation Chapter is very explicit on the matter of hoisting and travelling shafts, and does not allow a shaft to work while men are on the ladders. In this case, it appears, on enquiry, that the tub was supposed to be empty when the day shift went down. To save time they induced the deck-man to hoist up the tub for their drills, &c., before one was at the bottom to send it away. He demurred on the ground that it was against his orders to do so, but was overpersuaded when it was represented to him that the tub was empty. However, some of the night shift attending to the pump had left the plank across the top of the tub, and the accident happened as above related. It was difficult to say who was the most to blame in the matter, and the unfortunate miner himself tacitly if not actively sanctioned the infraction of the rule.

In the Cumberland pit a man, who persisted in riding on a full tub up the slope although warned not to do so, was injured, though not mortally, on the tub leaving the rails.

#### SURFACE ACCIDENTS.

The third fatal accident of the year was of this class. It occurred at the Spring Hill Colliery in April. Leonard Townshend, a carpenter, was helping to put up an ordinary horse gin, and was pinching the bottom of the upright into the iron socket, when it fell over. He

ndeavored to get from under it, but was struck by the drum and instantly crushed to death.

The only other accident of any moment to be noted happened at Lowrie in July. The engine tender was moving the engine into position to connect the pump rods—the engine both hoists and —when the fire-boy, who was bringing in a wrench, carelessly stepped on the crank and had his leg jammed against the bed plate, a thigh-bone broken.

All of which is respectfully submitted,

I have the honor to be,

Sir,

Your obedient servant,

HENRY S. POOL

*Inspector of*



## LIST OF MINERAL LEASES (OTHER THAN COAL.)

No.	LESSEE.	DISTRICT.	Area Sq. Miles.
	COPPER.		
	COLCHESTER Co.		
	Patterson, Abraham .....	Tatamagouche .....	10½
	LEAD.		
	HALIFAX Co.		
1	McClure, Charles F. ....	Gay's River .....	1
	IRON.		
	Pictou Co.		
32, 33, 34, 36, 37	Hamilton, John and others .....	East River .....	6
35	Carmichael, John R. ....	" .....	1
	CAPE BRETON Co.		
84	Protheroe, Pryse .....	Cow Bay .....	1
	INVERNESS Co.		
16	Inverness C. J. & R. Co. ....	Whycocomagh .....	1
Total area under lease .....			20½ square miles,

## LIST OF COAL LEASES.

No.	Lessee	Colliery.	Area Sq. Miles.	Working.	Agent and Manager.	Postal Address.
1	McKinnon, et al.....	ANTIGONISH Co. .....	3			
13, 14, 15	Black, C. H. M.....	CUMBERLAND Co. .....	3			
21	Blight, James, et al.....	.....	1			
11	Bradley, Benj.....	.....	1		John Moffatt.....	River Hebert.
25	Campbell, Alex., et al.....	.....	1			
32, 34	Campbell, Alex., et al.....	.....	2			
35	Campbell, Alex.....	.....	1			
31, 33, 37, 38, 40, 41	Campbell, John.....	.....	6			
12	Cumberland C. M. Co.....	.....	4			
17	Domville, James.....	.....	3		E. N. Sharp.....	St. John, N. B
	General Mining Association.....	.....	4			
	Joggins C. M. Association.....	Joggins.....	2	working	{ B. B. Barnhill..... Robert Redpath.....	Joggins.
	Joggins C. M. Co.....	Cumberland.....	2	working	A. J. Hill.....	Joggins.
20	Kirby, Lewis R.....	.....	1			
18, 19	Livesey, John.....	.....	2			
5	Lawson C. M. Association.....	Macrae.....	1			

24	Shannon, S. L.....	.....	.....	2	working	<i>William Hall</i> .....	Spring Hill.
36, 39	Shannon, S. L., (in trust) et al..	.....	.....	2		J. S. Hickman.....	Amherst.
48	Sharp, E. N.....	.....	.....	1			
6, 7, 8	Spring Hill Mining Co.....	Spring Hill.....	.....	3			
22, 23, 28, 29, 30	Styles Mining Co. [Limited].....	.....	.....	5			
9	Victoria Coal Mining Co.....	.....	.....	2			
26, 27	Wright, John V.....	.....	.....	3			
				58			
			Pictou Co.				
1	Acadia Coal Co.....	Fraser.....	.....	1	working	Jesse Hoyt.....	Stellarton.
3	" " ".....	Acadia.....	.....	1			
19, 21, 22	" " ".....	Pictou.....	.....	4			
23	Allan, Sir Hugh, Kt.....	Vale.....	.....	3	working	{ J. B. Moore..... <i>John Greener</i> ....	New Glasgow, Vale Colliery.
10	Gray, B. G.....	.....	.....	1			
11	Haliburton, R. G., et al.....	.....	.....	1			
	Halifax Company, (limited).....	Albion.....	.....	4		{ S. Cunard & Co.... <i>James Hudson</i> ...	Halifax. Stellarton.
13, 14	Intercolonial Company.....	.....	.....	2	working	Robert Simpson.....	Westville.
12	" " ".....	Drummond.....	.....	1			
6	Kirby, Lewis R., et al.....	.....	.....	1			
15, 30, 31	Merigonish Company.....	.....	.....	3			
25	Nova Scotia Company.....	Black Diamond..	.....	4	working	W. W. White.....	Westville.
20	Price, D. E., et al.....	.....	.....	2			
24	Richey, M. H.....	.....	.....	1			
				29			





LIST OF GOLD MINES.—*Continued.*

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and Manager.	Postal Address.
9	Evans, Thomas ( <i>sea area</i> ).....	.....	1	working	John P. Lawson....	Port Hood.
13	Murray, George.....	Port Hood.....	3			
12	McCully, Jona., et al.....	.....	1			
4	Richey, M. H., et al.....	.....	1			
11	Ross, W. J.....	Broad Cove.....	1			
6	Ross, H. E., et al ( <i>sea area</i> ).....	.....	1			
7	Ross, H. E., et al.....	.....	1			
14, 15	Smyth, Peter.....	.....	2			
10	Tremain, E. D., ( <i>sea area</i> ).....	.....	1			
			15			
2	Marraud, A. E.....	RICHMOND Co. Little River.....	1	working	John Macdonald....	New Campbellton
		VICTORIA Co.				
2	Campbell, Charles J.....	New Campbellton	3			
3, 4, 5,	Ross, Hon. William.....	Black Rock.....	5			
			8			

Total area under lease 939½ square miles

COAL TRADE BY COUNTIES.  
TABLE A'

1876.	CUMBERLAND.		PICTOU.		CAPE BRETON.		OTHER COUNTIES.		TOTAL.		1875.
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	
1st Quarter.....	12,472	9,938	78,233	18,521	39,913	4,066	450	62	131,068	32,607	31,788
2nd Quarter.....	23,198	19,373	78,101	75,537	79,789	65,384	1,763	1,494	182,851	161,788	161,421
3rd Quarter.....	30,847	28,891	72,174	104,984	113,209	124,187	3,086	2,188	219,316	260,250	328,154
4th Quarter.....	26,715	26,326	77,882	76,576	71,191	75,171	623	1,489	176,411	179,562	185,432
Total.....	93,232	84,528	306,390	275,618	304,102	268,808	5,922	5,253	709,646	634,207	706,795
1875. ....	64,797	60,944	382,662	337,102	328,425	304,702	5,281	4,047	781,165	706,795	706,795
1874. ....	51,580	49,599	410,876	357,926	404,268	337,016	5,996	4,586	872,720	749,127	749,127
1873. ....	27,592	26,345	383,949	333,984	639,085	520,189	841	588	1,051,467	881,106	881,106
1872. ....	15,750	14,153	422,716	388,417	437,326	380,274	5,158	3,070	880,950	785,914	785,914

COAL TRADE BY COUNTIES.  
TABLE B.

MARKETS.	CUMBERLAND.		PICTOU.		CAPE BRETON.		OTHER COUNTS.		TOTAL.		Grand Total.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	
Nova Scotia—											
Land Sales.....	3,168	2,821	97,413	25,679	6,831	3,175	1,192	132	48,604	31,807	80,411
Sea-borne.....	928	.....	50,333	5,716	80,762	4,255	3,253	....	135,276	9,971	145,247
Nova Scotia—Total.	4,096	2,821	87,746	31,395	87,593	7,430	4,445	132	183,880	41,778	225,658
Quebec.....	.....	.....	84,878	248	31,667	370	140	....	116,685	618	117,303
New Brunswick....	63,039	13,330	4,667	1,180	18,999	503	172	....	86,877	15,013	101,890
Newfoundland.....	.....	.....	1,589	279	49,553	185	136	....	51,278	464	51,742
P. E. Island.....	.....	.....	17,048	22,999	6,075	558	228	....	23,351	23,557	46,908
United States.....	1,242	.....	17,600	1,987	38,044	12,761	.....	....	56,886	14,748	71,634
West Indies.....	.....	.....	4,002	.....	13,969	.....	.....	....	17,971	.....	17,971
Europe.....	.....	.....	.....	.....	1,101	.....	.....	....	1,101	.....	1,101
	60,075	13,332	102,520	52,920	115,001	21,007	5,101	132	190,030	90,170	280,200



## COAL SALES.

MARKETS.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1876.	1875.
Nova Scotia—						
Land Sales.	19,139	15,540	15,140	30,592	80,411	57,718
Seaborne...	2,951	33,372	60,388	48,536	145,247	154,912
Total.....	22,090	48,912	75,528	79,128	225,658	212,630
Quebec.....		43,867	57,887	15,549	117,303	189,754
New Brunswick	8,826	21,466	41,105	30,493	101,890	85,968
Newfoundland...	558	8,438	24,702	18,044	51,742	62,348
P. E. Island....		11,000	23,369	12,539	46,908	43,641
United States...		24,974	34,836	11,824	71,634	89,746
East Indies....						1,003
West Indies....	1,133	2,582	2,823	11,433	17,971	16,429
South America...						4,779
Europe.....		549		552	1,101	
Total.....	32,607	161,788	260,250	179,562	634,207	706,795

## COAL—GENERAL STATEMENT.

1876.	Produce.	Sales.	Colliery Consumption.
1st Quarter.....Tons.	131,068	32,607	32,284
2nd " .....	182,851	161,788	26,444
3rd " .....	219,316	260,250	25,395
4th " .....	176,411	179,562	29,665
Total.....1876	709,646	634,207	113,788
Total.....1875	781,165	706,795	124,110
Total.....1874	872,720	749,127	119,582
Total.....1873	1,051,467	881,106	108,398
Total.....1872	880,950	785,914	101,341



Statement of the number and classes of persons employed, and average results at each Colliery, during the year ended Dec'r 31st, 1876.

COLLIERIES.	UNDERGROUND.				SURFACE.				Construction.		Total.		Average No. of days per person.		Average tons per day per Cutter.	Average quantity raised per day—Tons.	Horses.		Pits Worked.
	Cutters.	Laborers.	Boys.	Days Labor.	Mechan. Ice.	Laborers.		Days Labor.	Persons.	Days Labor.	Persons.	Underground.	Surface.	Average tons per Cutter.			Above.	Below.	
Cumberland.....	11	2	1	2,494	6	7	2	2,193	12	2,398	41	7,085	178	146	459	19	1	.....	261
Scotia.....	6	2	1	1,064	1	2	1	1,013	13	2,067	13	2,067	117	283	214	11	1	.....	112
South Joggins.....	30	2	10	9,654	11	8	3	5,206	.....	.....	64	14,860	230	236	476	76	4	4	186
Spring Hill.....	90	35	21	38,807	19	39	7	16,739	3	652	214	56,198	266	267	806	280	3	6	259
Acadia.....	83	25	18	27,318	21	42	3	18,306	.....	.....	192	45,624	216	277	726	284	15	5	213
Albion Mines.....	268	50	77	80,058	47	132	41	58,011	.....	.....	615	138,069	202	263	508	27	28	{ De 169 } { M <sup>o</sup> 206 }	
Intercolonial.....	71	33	20	21,338	33	43	11	24,024	3	524	214	45,886	172	276	758	237	7	3	227
Nova Scotia.....	33	9	8	13,194	8	13	14	6,993	.....	.....	85	20,187	264	199	647	114	4	3	186
Vale.....	77	17	11	22,741	30	32	3	10,191	.....	.....	170	32,932	216	156	449	342	2	7	101
Block-house.....	54	6	21	13,171	19	27	2	11,308	.....	.....	129	24,479	162	235	644	269	6	16	129
Caledonia.....	44	6	10	12,682	11	15	2	6,807	.....	.....	88	18,469	211	207	699	208	8	7	148
O Collins.....	34	6	7	8,396	10	13	5	5,378	8	2,083	83	15,847	178	192	286	38	2	2	198
Emery.....	1	.....	1	626	4	7	1	1,507	.....	.....	14	2,133	126	.....	.....	.....	6	.....	.....
Gardiner.....	61	6	22	10,996	10	44	11	1,110	12	92	5	1,110	222	.....	.....	.....	2	.....	.....
Gowrie.....	51	3	17	14,265	14	8	4	10,161	13	92	166	21,248	123	156	479	247	6	15	118
Glace Bay.....	61	3	17	14,265	14	8	4	6,244	30	3,916	137	24,425	201	240	588	124	6	14	241
International.....	48	11	9	12,509	21	13	7	8,749	.....	.....	109	21,258	184	213	502	256	8	11	94
Lingan.....	46	5	12	8,464	.....	24	10	8,813	6	338	103	17,615	134	260	332	126	8	8	122
Ontario.....	34	3	2	5,412	4	30	2	4,269	.....	.....	75	9,681	139	119	326	58	3	2	190
Reserve.....	3	.....	.....	663	.....	4	2	1,583	.....	.....	10	2,225	195	.....	.....	.....	13	.....	.....
Schooner Pond.....	.....	.....	.....	.....	.....	1	17	901	.....	.....	20	901	45	.....	.....	.....	3	.....	.....
South Head.....	3	.....	1	226	2	2	1	152	4	61	11	439	56	51	217	11	3	.....	56
Sydney Mines.....	165	42	77	67,965	50	76	28	42,431	78	21,948	516	132,334	239	275	622	473	19	49	217
Victoria.....	37	20	6	10,818	9	13	5	6,394	.....	.....	90	17,212	172	237	477	108	1	2	163
Port Hood.....	8	3	2	2,266	2	2	2	981	8	819	27	4,066	174	163	318	18	1	.....	137
New Campbellton.....	22	5	3	3,155	4	9	5	3,635	48	6,788	105	201	153	.....	.....	17	4	.....	189
	1,279	291	357	388,231	346	618	174	262,076	1,164	32,831	3,229	683,138	202	290	555	181	147	188	170

# MINES REPORT.

COLLIERIES.	Shafts.	Slopes.	Adits.	Machinery.	Colliery Buildings.	Dwellings.	Surface Work.	Railways.	Wharves.	Prospecting.	Total.
CUMBERLAND CO.											
Cumberland.....	\$.....	\$1,789.00	\$2,950.00	\$ 2,158.00	\$ 395.00	\$ 590.00	\$ 695.00	\$ 155.00	\$ 720.00	\$ .....	\$ 9,452.00
Spring Hill.....	.....	.....	.....	283.11	383.00	.....	1,055.00	.....	.....	28.05	1,749.16
PICTOR CO.											
Acadia.....	.....	.....	.....	.....	208.66	748.74	468.84	143.12	.....	.....	1,569.36
Albion Mines.....	.....	.....	.....	4,068.43	102.45	1,085.30	924.24	.....	.....	.....	6,180.42
Intercolonial.....	.....	.....	.....	140.86	154.76	.....	.....	2,019.38	.....	.....	2,315.00
Nova Scotia.....	.....	.....	.....	.....	68.00	.....	.....	508.00	.....	764.00	1,340.00
CAPE BRETON CO.											
Collins.....	.....	1,176.71	1,803.31	10,745.09	1,351.61	.....	271.04	1,137.25	681.34	.....	17,166.35
Glace Bay.....	7,206.24	.....	.....	.....	.....	.....	.....	.....	.....	.....	7,206.24
Gowrie.....	.....	350.00	448.00	.....	.....	.....	1,150.00	126.00	.....	.....	2,074.00
International.....	.....	28.41	.....	.....	.....	.....	.....	.....	.....	.....	28.41
Lingan.....	.....	.....	1,883.00	188.00	186.00	.....	.....	.....	.....	.....	2,257.00
Ontario.....	.....	.....	566.14	.....	.....	80.00	.....	.....	.....	.....	646.14
Sydney Mines.....	8,987.06	.....	.....	3.30	.....	209.78	101.54	1,445.34	3,324.98	.....	14,072.02
INVERNESS CO.											
Port Hood.....	.....	2,250.00	660.00	.....	478.00	.....	86.00	.....	.....	.....	3,474.00

## INTERCOLONIAL RAILWAY.

*Statement of Coal received at the several stations, from Mines in Nova Scotia, &c., for year ended, December, 1876.*

STATIONS.	Quantity Tons.	STATIONS.	Quantity Tons.
*Halifax .....	10,167	*Dorchester .....	19,362
Bedford .....	88	Memramcook .....	185
Windsor Junction .....	5,710	Painsec .....	6
Enfield .....	316	Shediac .....	376
Elmsdale .....	70	Point DuChene .....	62
Milford .....	46	Moncton .....	1,654
Shubenacadie .....	358	Salisbury .....	144
Stewiacke .....	60	Petitcodiac .....	317
Brookfield .....	64	Anagance .....	12
Truro .....	4,614	Penobsquis .....	34
Riversdale .....	6	Sussex .....	524
West River .....	16	Apohagin .....	42
Hopewell .....	214	Norton .....	30
New Glasgow .....	2,084	Bloomfield .....	6
*Pictou Landing .....	71,957	Passe Keag .....	54
DeBert .....	48	Hampton .....	204
Londonderry .....	9,952	Nauwigewauk .....	6
Wentworth .....	6	Rothesay .....	108
Greenville .....	10	Saint John .....	9,013
Thompson .....	12	Chatham .....	127
Oxford .....	236	Miramichi .....	265
River Philip .....	15	Bathurst .....	30
Athol .....	58	Campbellton .....	44
Maccan .....	6	Flag Stations .....	761
Amherst .....	1,640		
Aulac .....	112	Total Tons .....	142,019
Sackville .....	788		

\* Shipping Ports.

## MISCELLANEOUS NOTES

### PORT OF HALIFAX.

1876.	Imports.	
Coal, Anthracite.....	7,313 tons, \$28,698.....	
" Bituminous.....	" ".....	69 tons

NOTE.—See report for 1875 for shipments of previous years.

AMERICAN GAS COAL.—Cannelton coal imported into the Provinces for gas making, 3000 tons; and Cannelton gas coke 2500 tons.

COKE			
made at			
Albion Mines, 6,912 tons.	Spring Hill, 31 tons.	Sydney, 49 tons.	London, ?

### DOMINION OF CANADA.

#### IMPORTED COAL AND COKE.

From	1874-5.	1875-6.
Great Britain....	139,600 tons, \$ 551,317....	168,642 tons, \$
United States....	512,885 " 2,524,771....	625,203 "
Newfoundland..	110 " 330....	
Spanish W. Indies ....	....	10 "
St. Pierre, &c....	....	25 "
	652,545 tons, \$3,076,418	793,880 tons, \$

### THE PROVINCES OF THE DOMINION IMPORTED

#### COAL AND COKE.

	Great Britain.	United States.	S. W. Indies.
Nova Scotia.....	1,715	5,096	10
New Brunswick.....	7,782	24,059	
P. E. Island.....	....	314	
Quebec.....	159,055	122,673	
Ontario.....	5	472,716	
Manitoba.....	....	282	
British Columbia....	85	63	

*COAL SALES in Nova Scotia from 1785 to 1876 (Inclusive.)*

Year.	Sales.	Total.	Year.	Sales.	Total.
1785	1,668	14,349	1831	37,170	839,981
1786	2,000		1832	50,396	
1787	10,681		1833	64,743	
1788			1834	80,813	
1789			1835	56,434	
1790			1836	107,593	
1791	2,670		1837	118,942	
1792	2,143		1838	106,730	
1793	1,926		1839	145,962	
1794	4,405		1840	101,198	
1795	5,320	51,048	1841	148,298	1,533,798
1796	5,249		1842	129,708	
1797	6,039		1843	106,161	
1798	5,948		1844	108,482	
1799	8,947		1845	150,674	
1800	8,401		1846	147,506	
1801	5,775		1847	201,650	
1802	7,769		1848	187,643	
1803	6,601		1849	174,592	
1804	5,976		1850	180,084	
1805	10,130	70,452	1851	153,499	2,399,829
1806	4,938		1852	189,076	
1807	5,119		1853	217,426	
1808	6,616		1854	234,312	
1809	8,919		1855	238,215	
1810	8,609		1856	253,492	
1811	8,516		1857	294,198	
1812	9,570		1858	226,725	
1813	9,744		1859	270,293	
1814	9,866		1860	322,593	
1815	9,336	91,527	1861	326,429	4,927,339
1816	8,619		1862	395,637	
1817	9,284		1863	429,351	
1818	7,920		1864	576,935	
1819	8,692		1865	635,586	
1820	9,980		1866	558,520	
1821	11,368		1867	471,185	
1822	7,512		1868	453,624	
1823	27,000		1869	511,795	
1824			1870	568,277	
1825		140,820	1871	596,418	4,353,567
1826			12,600	1872	
1827	12,149		1873	881,108	
1828	20,967		1874	749,127	
1829	21,935		1875	706,795	
1830	27,269		1876	634,207	
				Total.....	

## SUMMARY.

1775 to 1790	14,349	1831 to 1840	839,981
1791 " 1800	51,048	1841 " 1850	1,533,798
1801 " 1810	70,452	1851 " 1860	2,399,829
1811 " 1820	91,527	1861 " 1870	4,927,339
1821 " 1830	140,820	1871 " 1876	4,353,567

NOTE.—If 18 per cent. be allowed for colliery consumption, the total output has been 16,297,562 tons.

*REPORT of the Chief of the Bureau of Statistics, 1876*

*(Extract.)*

**COAL TRADE WITH BRITISH AMERICA.**

United States.	Exported.	Imported.
1865	\$ 815,794	\$ 13,977
1866	660,151	243,891
1867	889,672	855,639
1868	916,310	782,687
1869	954,026	758,588
1870	1,048,347	613,106
1871	1,100,732	640,459
1872	1,455,591	608,623
1873	2,175,758	888,202
1874	3,062,679	1,077,464
1875	2,034,527	607,673

NOTE.—The quantities entered as imported by the United States in 1865, and 6 are underestimated, when the known quantities exported by Nova Scotia are compared. the duty of \$1.25 was imposed, and the stated values of the coal imported in the following subsequent years are much more reliable.—H. S. P.

*Nova Scotia exported to the United States.*

**COAL.**

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	98,173	24 ad.	1864	347,594	Free.
1851	116,274	"	1865	465,194	"
1852	87,542	"	1866	404,252	"
1853	120,764	"	1867	338,492	"
1854	139,125	Free.	1868	228,132	"
1855	103,222	"	1869	257,485	"
1856	126,152	"	1870	168,180	"
1857	123,335	"	1871	165,431	"
1858	186,743	"	1872	154,092	"
1859	122,720	"	1873	264,760	"
1860	149,289	"	1874	138,335	"
1861	204,457	"	1875	89,746	"
1862	192,612	"	1876	71,634	"
1863	282,774	"			

NOTE.—The quantities given for the Years 1850 to 1872 are on the authority of the Board of Trade, Philadelphia, and are probably underestimated. At least, the figures given for the year 1873, the only year available for comparison with the comparative tables now published by this Department, are 12 per cent. below those given in the table.—H. S. P.



## VENTILATION BY FURNACE.

COLLIERY.	FURNACE DIMENSIONS. In feet.				Length of Column.	Courses.			TEMPERATURE. (Fahr.) degrees			Cubic feet per hour.	Coal used per day.
	Length of Furnace.	Width.	Height above base.	Height below base.		Number.	Greatest Length.	Least Length.	Downward.	Upward.	Return.		
Joggins.....	5	6	4	2	145	2	2900	13'	38	108	48	27,300	1½
Spring Hill.....	6	6	4½	2½	24	1	3000	36	76	94	66	1,200	1½
Acadia.....	6	11	6	2½	100	2	7000	84	75	134	64	27,200	1½
Albion Cage Pit.....	6	7	7	2½	120	3	10,000	50	38	60	54	33,000	1½
Intercolonial No. 4.....	4½	6	3½	2	88	1	3300	75'	.....	.....	.....	19,000	8 cwt.
Nova Scotia.....	6	10	9	3	200	4	7200	40"	40	130	55	52,000	1½
Vale.....	5½	7½	5	2	140	2	3000	36	.....	.....	.....	25,000	.....
Blockhouse.....	6	6½	5	1½	122	2	5000	50	23	58	.....	30,000	.....
Caledonia.....	6	7	4½	2½	140	2	8000	40	64	68	50	14,000	.....
Emery.....	.....	.....	.....	.....	.....	1	4300	36	62	68	66	21,500	.....
Glacs Bay (Harbor).....	4	4	1½	1½	40	1	7500	30	76	.....	53	7,000	.....
Gardener.....	.....	.....	.....	.....	.....	1	3000	32	10	95	50	18,000	.....
Gowrie.....	7	4½	6	2½	204	2	9700	36	36	71	.....	10,400	.....
International.....	9	6½	5	3½	100	1	6700	45	38	.....	52	15,000	.....
Lingan.....	7	7	4	1½	48	2	9000	33	38	.....	61	22,400	.....
Reserve.....	9	5½	3½	2½	108	7	4600	16	62	100	72	26,200	.....
Sydney.....	6	5½	4	2½	380	2	16,500	36	38	122	57	37,500	4 tons.
Victoria.....	4	4½	3	3	80	2	11,000	9	39	51	49	6,000	.....
New Campbellton.....	6	3	1	2	17	2	2500	9	.....	.....	.....	7,900	.....

## VENTILATION BY FAN.

COLLIERY WINDING ENGINES AT SHAFTS.

COLLIERIES.	Nominal Horse Power.	No. of Cylinders.	Diam. of Cylinder in inches.	Length of Stroke in inches.	How Geared, (Direct or Ratio.)	Diam. of Drums ft.	Size of Rope in.	Depth of Shaft ft.	Coal draw each trip in cwt.	No. of Boilers.	Length in ft.	Diam. in inches.	Working Pressure in lbs.
Albion, Foord Pit .....	315	2	38	60	D	18	6½	980	45	5	35	66	40
" Cage Pit .....	75	1	27	60	D	5	3½x½	274	11	1	35	66	40
Blockhouse .....	23	1	15	48	3 F	5	4½	80	12	3	40	30	60
Caledonia .....	21	2	11	24	4	6	4½x½	205	25	5	30	30	60
Gardener .....	81	2	20	48	D	8	4	160	20	4	27	39	45
Glace Bay, Sterling Pit .....	26	2	12	33	D	6	.....	224	.....	4	35	36	40
Gowrie .....	85	2	20	42	D	8	.....	260	.....	4	30	36	40
" .....	25	1	16	42	2	8	3½x½	220	9	2	27	60	35
International .....	50	2	16	42	1½	6½	3	87	13	2	24	42	45
Sydney, Queen's Pit .....	134	1	33	72	D	10½	4½	360	23	5	30	60	26
" Lloyd's Cove Pit .....	283	2	30	60	D	18	6	681	40?	4	35	66	40

## COLLIERY WINDING ENGINES AT SLOPES.

COLLIERIES	Nominal Horse Power.	No. of Cylinders.	Dia. of Cylinders.	Length of Stroke.	How Geared.	Dia. of Drum.	Size of Rope.	Length of Slope.	Dip. of Seam.	Coal drawn each trip in cwt.	No. of Rollers.	Length.	Diameter.	Working Pressure.
Cumberland .....	21	2	11	30	3	8	2½ in.	730 ft.	19°	33	3	25 ft.	33 in.	50 lbs.
Joggins .....	11	2	11	30	3	8	3 in.	750 ft.	19°	33	2	25 ft.	33 in.	50 lbs.
Spring Hill .....	54	2	18	27	4	9	3½ in.	830 ft.	36°	50	4	30 ft.	60 in.	50 lbs.
Acadia .....	44	2	15	42	4	9	3½ in.	1460 ft.	23°	60	12	30 ft.	32 in.	40 lbs.
Intercolonial No. 1 .....	47	2	16	36	2 F	8	3½ in.	1250 ft.	16°	60	3	30 ft.	60 in.	35 lbs.
No. 4 .....	17	1	14	30	2	5	3½ in.	1500 ft.	14°	60	1	18 ft.	48 in.	40 lbs.
Nova Scotia .....	45	2	16	30	4	10	4 in.	1600 ft.	29°	50	9	30 ft.	30 in.	60 lbs.
Vale .....	21	2	12	18	4	6	3 in.	840 ft.	33°	50	7	29 ft.	36 in.	55 lbs.
Collins .....	24	2	12	24	2	6	2 in.	1000 ft.	5°	40	3	30 ft.	36 in.	50 lbs.
Emery .....	48	1	22	44	2½ F	5	3 in.	1205 ft.	4°	100	5	30 ft.	36 in.	50 lbs.
Lingan .....	143	2	26	42	D	21	3 in.	2250 ft.	16°	300	2	25 ft.	72 in.	28 lbs.
Reserve .....	48	1	22	44	2½ F	5	2½ in.	2204 ft.	4°	150	5	30 ft.	36 in.	50 lbs.
Schooner Pond .....	13	1	12	30	3½	3½	2½ in.	653 ft.	9°	60	1	15 ft.	60 in.	50 lbs.
Victoria .....	104	2	22	54	D	10	4 in.	864 ft.	41°	60	7	30 ft.	36 in.	60 lbs.
Port Hood .....	12	1	12	24	5	5	2 in.	660 ft.	23°	40	2	30 ft.	30 in.	60 lbs.
New Campbellton .....	5	1	8	14	2	4	2 in.	400 ft.	12°	20	1	8 ft.	4 in.	35 lbs.
Block House .....	24	1	15	44	F	5	2 in.	1950 ft.	4°	80	3	40 ft.	36 in.	60 lbs.



## GOLD.

## GENERAL STATEMENT FOR THE YEAR 1876.

*Shewing the number of Mines at work, days labour performed, quantities of Quartz crushed, yield of Gold, &c., &c., for the twelve months ended December 31st.*

Districts.	Number of Mines.	Days Labour.	Mills Employed.	Steam Power.	Water Power.	Total No. of Stamps working one day.	Quartz, &c., Crushed.	Yield per Ton.			Maximum yield per Ton.			Total yield of Gold.			Average yield per man per day for twelve months, at \$18.00 per oz.
								oz.	dwt.	gr.	oz.	dwt.	gr.	oz.	dwt.	gr.	
Caribou.....	3	6,000	2	2	....	....	542	1	6	11	2	....	8	717	4	10	\$2.15
Gays River....	2	2,504	1	1	....	....	1,699	....	2	21	....	3	3	246	10	4	1.76
Montagu.....	2	1,405	1	1	....	....	81	1	16	19	19	....	....	149	1	17	1.90
Oldham.....	12	15,757	2	....	2	3,900	1,705	1	2	21	6	10	20	1,953	5	23	2.23
Renfrew.....	3	1,307	1	....	1	540	164	....	9	5	10	19	....	75	14	10	1.03
Sherbrooke....	10	37,269	4	2	2	6,324	6,205	....	16	16	6	4	....	5,176	15	15	2.49
Stormont.....	2	3,607	1	....	1	....	370	....	14	10	5	16	....	267	....	5	1.36
Tangier.....	3	8,274	3	2	1	....	716	....	10	16	1	6	19	382	13	....	0.83
Uniacke.....	2	4,752	1	1	....	....	321	....	14	4	5	12	....	227	14	10	0.86
Waverley.....	4	2,107	2	1	1	....	1,661	....	18	12	2	12	....	1,539	7	....	1.31
Wine Harbour..	3	7,848	1	1	....	2,244	1,929	....	12	15	4	19	....	1,217	19	7	2.79
Other Districts..	2	1,474	4	2	2	....	97	....	17	14	2	2	14	85	7	13	1.03
	48	111,304	23	13	10	....	15,490	....	15	13	19	....	....	12,038	13	18	\$1.94

1878.  
MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

MONTH.	OARIBOU.						BENTLEY.						MONTEAU.					
	No. Mines.	Days Labor.	Men.	Tons.	Gr.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Gr.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Gr.	Gr.
January.....	..	.....	.....	.....	.....	.....	2	215	8	.....	.....	.....	3	179	7	17	30	.....
February.....	..	.....	.....	.....	.....	.....	3	307	12	140	17	.....	3	285	11	3	22	.....
March.....	..	.....	.....	.....	.....	.....	3	241	9	200	12	.....	2	238	9	13	42	.....
April.....	..	.....	.....	.....	.....	.....	2	242	9	150	13	.....	3	307	12	12	*28	.....
May.....	1	670	26	.....	.....	.....	3	346	13	180	29	.....	1	16	1	..	..	.....
June.....	1	795	30	.....	.....	.....	3	337	13	180	28	.....	1	135	5	20	15	.....
July.....	2	866	26	100	119	9	2	196	8	180	28	20	1	20	1	..	..	.....
August.....	3	735	28	58	72	19	2	172	7	185	20	2	1	40	2	..	..	.....
September..	3	661	25	113	120	5	2	168	6	170	23	11	1	20	1	5	2	.....
October.....	3	769	29	69	124	6	2	218	8	180	22	..	2	91	4	8	5	.....
November...	4	892	34	67	76	5	1	25	1	50	24	..	1	35	1	..	..	.....
December...	4	916	31	102	90	1	1	27	1	84	27	1	1	60	1	..	..	.....

## MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(Continued.)

MONTH.	WAYRELEY.						WINE HARBOR.						OTHER DISTRICTS.								
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January.....	4	1,781	69	109	99	1	1	3	803	31	188	69	....	1	2	86	3	11	13	217	
February.....	4	1,691	65	106	109	12	..	2	692	27	149	94	....	..	2	201	8	....	....	....	....
March.....	5	1,959	75	207	197	19	..	2	660	25	251	129	....	..	2	167	6	10	8	13	....
April.....	5	1,670	64	253	193	13	..	3	559	22	142	57	....	..	1	75	3	3	1	9	5
May.....	4	1,972	76	91	151	15	..	3	537	21	220	118	8	20	1	49	2	....	....	....	....
June.....	4	1,762	68	134	97	1	..	3	652	25	215	152	1	22	1	34	1	6	....	12	19
July.....	3	1,581	61	143	139	..	..	3	593	23	148	115	15	12	2	167	6	35	18	112	....
August.....	3	1,645	63	99	97	10	..	4	700	27	96	94	5	6	1	85	3	2	1	11	21
September.....	6	2,154	83	131	105	19	..	4	567	22	130	141	11	18	2	206	8	....	....	....	....
October.....	4	1,644	63	145	127	2	..	3	556	21	110	88	1	..	2	135	5	7	11	13	1
November.....	5	1,643	63	120	141	16	..	5	845	32	203	112	11	3	3	88	3	8	7	11	12
December.....	5	1,605	62	123	78	19	..	4	684	26	77	46	....	16	3	181	7	15	23	4	9
	42	21,107	....	1,661	1,539	7		3	7,848	....	1,929	1217	19	7	2	1,474	....	97	85	713	

## MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(Continued.)

MONTH.	OLDHAM.							RENFREW.							SHERBROOK.						
	No. Mines.	Days Labor.	Men.	Tons.	Or.	Date.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Or.	Date.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Or.	Date.	Gr.
January.....	8	1,600	61	56	197	6	18	3	100	4	8	2	16	4	10	2,816	108	533	480	14	22
February.....	8	1,000	40	96	171	13	2	4	150	6	13	6	5	..	10	2,800	108	490	427	11	16
March.....	10	1,422	55	86	217	10	11	5	203	8	33	14	15	21	10	2,800	108	358	302	16	1
April.....	12	1,364	52	76	48	6	4	3	179	7	35	13	3	23	8	2,756	106	404	042	4	2
May.....	12	1,315	51	282	178	15	10	2	86	3	28	11	6	13	9	2,652	102	472	413	1	..
June.....	14	979	38	124	146	15	12	3	96	4	..	..	..	..	10	2,808	108	532	322	7	12
July.....	10	1,238	48	196	154	18	4	2	65	3	..	..	..	..	12	3,016	116	282	252	14	6
August.....	14	992	38	102	53	14	2	4	85	3	..	..	..	..	10	3,321	128	585	466	16	4
September.....	12	1,428	55	47	70	18	9	3	88	3	14	5	10	..	12	3,510	135	428	343	10	12
October.....	15	1,479	57	256	285	8	8	3	85	3	10	9	15	10	9	3,536	136	868	645	4	..
November.....	13	1,548	60	212	248	13	9	3	95	4	5	5	10	8	10	3,614	139	700	587	6	12
December.....	13	1,309	53	179	170	7	6	3	75	3	18	6	11	3	10	3,640	140	534	530	0	..



## MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(Continued.)

MONTH.	STORMONT.						TANGIER.						UNLACKE.								
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gra.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gra.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gra.
January.....	3	240	9	...	...	...	...	3	1,089	42	7	3	...	...	3	330	13	17	13	15	20
February.....	3	280	11	...	...	...	...	3	1,585	61	...	...	...	...	2	178	6	40	9	1	...
March.....	3	242	9	...	...	...	...	3	1,081	41	...	*92	11	...	2	194	7	27	12	9	...
April.....	3	220	8	5	8	1	7	3	982	38	115	44	2	...	2	241	9	13	12	2	...
May.....	3	240	9	...	...	...	...	3	722	28	109	57	18	...	2	442	17	55	19	6	...
June.....	3	290	11	322	40	19	...	2	573	22	41	48	17	12	2	529	20	31	30	7	...
July.....	2	174	7	...	...	...	...	4	783	30	48	23	8	12	1	427	16	25	25	10	...
August.....	2	132	5	...	...	...	...	3	752	29	20	22	18	...	2	380	15	11	20	1	...
September....	3	790	30	...	...	...	...	3	523	20	89	+69	6	...	2	274	10	45	20	12	...
October.....	1	322	12	23	143	9	22	1	223	9	25	9	2	...	3	626	24	21	31	4	14
November.....	1	315	12	...	...	...	...	1	203	8	30	11	10	...	2	507	19	11	20	10	...
December....	1	362	14	20	74	10	...	1	208	8	...	...	...	...	2	624	24	25	12	16	...
	2	3,607	...	370	267	0	5	3	8,724	...	716	382	13	...	2	4,752	...	321	227	14	10

\* 3 oz. 16 dwts. from plates. + 15.12.

# MINES REPORT.

## GOLD. GENERAL ANNUAL SUMMARY.

Amount of Gold Mined.	Quartz Crushed.	Yield per Ton of 2000 lbs.	Total days Labor.	Average man per at 300 w \$18
Dwt. Gr.	Tons.	Oz. Dwt. Gr.		A day.
	6,473	1 2 11	156,000	\$0.8
14 17	17,002	16 11	273,624	.9
18 13	21,434	18 16	252,720	1.4
4 8	24,423	1 0 20	212,966	2.1
13 2	32,161	15 2	211,796	2.1
11 11	31,386	17 9	218,894	2.2
6 10	32,262	12 17	241,462	1.5
0 19	35,147	10 4	210,938	1.5
5 5	30,829	12 21	173,680	2.0
7 4	30,791	12 11	162,994	2.1
17 6	17,093	15 7	112,476	2.0
7 19	17,708	13 9	93,470	2.2
13 9	13,844	13 5	77,246	2.1
14 19	14,810	15 4	91,698	2.2
13 18	15,490	15 13	111,304	1.9
8 16	340,853		2,601,268	

## DISTRICT SUMMARIES.

### CARIBOU.

Amount of Gold Mined.	Stuff Crushed.	Yield per Ton of 2000 lbs.	Total days Labor.	Average y per day in
Dwt. Gr.	Tons.	Oz. Dwt. Gr.		Dwts.
0 23	1,583	12 17	11,076	1.8
11 2	755	16 6	6,500	1.8
15 23	479	1 1 1	2,864	3.4
15 0	368	11 9	2,184	1.9
16 12	21	16 23	312	1.1
10 23	333	1 2 3	4,651	1.5
12 19	368	1 4 6	3,675	2.4
4 10	542	1 6 11	6,000	2.3

### MONTAGU.

14 16	140	2 16 2	38,688	.1
19 14	545	1 18 15	11,492	1.8
12 23	615	1 9 8	12,376	1.4
15 10	382	1 6 0	6,032	1.6
15 16	244	1 15 11	7,826	1.1
14 22	350	1 13 10	7,384	1.5
13 14	572	1 8 3	8,944	1.8
9 5	916	4 3 14	15,106	5.0
8 15	848	3 14 8	15,938	3.9
10 6	683	2 12 17	13,832	2.5
3 9	679	2 2 9	10,972	3.6
0 22	496	1 6 10	5,452	2.4
18 17	72	3 19 23	2,526	2.2
1 17	81	1 16 19	1,405	2.8

## OLDHAM.

YEAR.	Total ounces of Gold extracted.	Quartz crushed.	Yield per ton of 2000 lbs.	Total days labor.	Average yield per man per day in dwt. at \$0.90.	
	Oz. Dwt. Gr.	Tons.	oz. dwt. gr.		dwt.	\$0.24
1862	51 0 0	84	12 3	4,368	.23	\$0.24
1863	1,223 3 21	1,026	1 4 6	25,896	.94	.84
1864	1,750 5 12	2,238	15 11	37,934	.94	.84
1865	1,126 11 20	2,236	10 1	18,278	1.23	1.10
1866	956 12 20	966	19 19	11,362	1.68	1.51
1867	1,100 3 14	870	1 5 7	15,418	1.42	1.27
1868	719 0 4	1,012	14 4	8,008	1.79	1.61
1869	1,394 16 0	1,735	16 1	17,576	1.58	1.42
1870	2,051 15 3	2,644	15 12	20,254	2.02	1.81
1871	1,718 12 12	1,374	1 4 4	13,494	2.54	2.28
1872	1,014 11 10	793	1 5 14	8,580	2.36	2.12
1873	998 2 17	662	1 10 3	6,994	2.85	2.46
1874	665 8 11	527	1 5 6	3,420	3.86	3.27
1875	915 8 3	550	1 13 6	6,100	3.00	2.70
1876	1,953 5 23	1,705	1 2 21	15,757	2.47	2.22

## RENFREW.

1862	308 8 0	171	1 15 10	10,920	.56	\$0.50
1863	785 7 7	575	1 7 7	21,216	.74	.66
1864	1,172 6 5	1,229	19 1	12,220	1.91	1.71
1865	1,008 10 18	927	1 1 18	14,430	1.39	1.25
1866	6,423 15 11	6,003	1 1 9	38,142	3.36	3.02
1867	7,904 19 2	7,222	1 2 4	61,308	2.57	2.31
1868	3,373 14 9	5,994	11 6	39,598	1.70	1.53
1869	3,097 15 7	7,258	8 12	34,606	1.79	1.61
1870	1,171 18 11	3,243	7 2	11,310	2.07	1.86
1871	1,179 17 16	2,463	9 4	10,972	2.15	1.93
1872	323 3 8	855	7 13	5,668	1.14	1.02
1873	59 16 18	255	4 16	2,028	.59	.53
1874	3 3 7	10	6 7	190	.33	.29
1875	47 16 6	113	8 11	690	1.38	1.24
1876	75 14 10	164	9 5	1,307	1.15	1.03

## SHERBROOKE.

1862	2,023 0 0	663	3 1 0	22,464	1.80	\$1.62
1863	3,304 14 12	3,454	19 8	31,200	2.11	1.89
1864	3,419 14 20	2,673	1 6 8	32,630	2.09	1.88
1865	3,424 1 21	2,511	1 7 6	23,010	2.97	2.67
1866	5,829 13 8	2,853	2 0 20	22,490	5.18	4.66
1867	9,463 18 0	7,378	1 5 15	35,958	5.31	4.78
1868	7,070 0 5	9,880	14 7	59,540	2.37	2.13
1869	5,546 11 16	11,500	9 15	41,964	2.64	2.37
1870	7,134 4 0	11,428	12 11	48,880	2.91	2.61
1871	6,579 19 7	13,882	9 9	50,856	2.58	2.32
1872	4,188 9 21	5,243	15 17	38,246	2.21	1.98
1873	5,026 0 4	7,187	15 9	31,460	3.19	2.87
1874	4,037 1 2	5,430	14 20	31,199	2.58	2.32
1875	5,818 15 10	6,443	18 1	38,683	3.00	2.70
1876	5,176 15 15	6,205	16 16	37,269	2.77	2.49

# MINES REPORT.

## STORMONT.

Total ounces of Gold extracted.			Stuff crushed.	Yield per ton of 2000 lbs.			Total days labor.	Average yield per day in c at \$0.90	
Oz.	Dwt.	Gr.	Tons.	oz.	dwt.	gr.		Dwt.	
397	0	0	197	2	0	7	12,792	62	
1,587	13	12	526	3	0	7	15,600	2.03	
1,510	4	21	636	2	7	11	25,844	1.16	
1,696	6	2	1,040	1	12	14	25,850	1.29	
1,254	17	9	2,253		11	2	11,208	2.23	
1,266	16	15	782	1	11	3	12,428	2.03	
673	2	17	596	1	2	14	14,560	.92	
227	0	13	590		7	16	6,110	.74	
578	5	15	1,525		7	13	6,552	1.76	
559	7	21	1,987		5	18	5,590	2.00	
472	0	11	543		17	9	4,316	2.18	
87	18	5	181		4	4	832	.91	
167	19	20	286		14	5	1,799	1.86	
267	6	18	620		8	14	<del>2,543</del>	2.10	
267	0	5	870		14	10	3,607	1.48	

## TANGIER.

865	0	0	707	1	4	11	39 000	.44	
494	8	21	655		15	2	87,440	<del>1.10</del>	
607	7	8	698		18	10	16,880	.74	
644	7	13	639	1	0	4	13,156	.97	
296	5	21	791		7	11	9,074	.63	
691	14	7	724		19	2	6,864	2.01	
921	8	9	725	1	4	7	11,700	1.57	
1,192	8	10	1,332		17	21	15,938	1.49	
1,814	2	10	2,732		13	6	29,328	1.23	
2,093	0	7	2,924		14	7	27,826	1.53	
829	8	15	1,622		10	5	10,426	1.59	
726	11	15	1,070		13	4	8,892	1.63	
419	7	5	706		11	21	5,092	1.64	
448	2	15	1,106		8	1	6,667	1.34	
382	13	0	716		10	6	8,274	.92	

## UNLACKE.

72	16	9	28	2	12	0	1,326	1.09	
1,622	13	20	1,968		16	12	14,274	2.27	
3,247	3	17	3,874		16	16	27,898	2.32	
1,867	3	12	3,172		11	18	22,022	1.69	
566	14	5	1,794		6	7	6,214	1.82	
360	17	3	900		8	0	4,342	1.66	
241	10	0	864		13	7	1,950	2.47	
129	8	18	198		13	1	1,222	2.52	
14	1	0	19		14	19	<del>50</del>	4.68	
139	3	3	<del>112</del>		8	17	2,643	1.05	
227	14	10	321		14	4	4,752	.90	

## WAVERLEY.

YEAR.	Total ounces of Gold extracted.	Stuff crushed.	Yield per ton of 2000 lbs.	Total days labor.	Average yield per man per day in dwts., at \$0.90.	
	Oz. Dwt. Gr.	Tons.	oz. dwt. gr.		Dwt.	\$
1862	1,507 0 0	3,741	8 1	46,800	.66	\$0.59
1863	2,380 6 3	6,755	7 1	58,344	.81	.72
1864	6,410 4 22	9,238	13 23	88,244	1.44	1.29
1865	14,404 4 9	12,518	1 3 0	87,308	3.29	2.96
1866	8,612 17 11	16,750	10 6	98,800	1.74	1.56
1867	3,942 5 2	10,510	7 12	46,436	1.69	1.52
1868	2,387 8 22	6,372	7 11	36,972	1.26	1.13
1869	1,591 14 10	3,915	8 3	16,796	1.89	1.70
1870	811 3 21	2,619	6 4	13,546	1.19	1.07
1871	1,427 18 12	2,772	10 6	17,472	1.62	1.45
1872	1,047 17 0	1,761	11 21	12,766	1.64	1.47
1873	1,009 0 0	2,013	10 0	13,520	1.49	1.34
1874	1,553 12 15	1,682	18 11	12,541	2.47	2.22
1875	1,740 1 0	1,313	1 6 12	18,807	1.85	1.66
1876	1,539 7 0	1,661	18 12	21,107	1.45	1.30

## WINE HARBOUR.

YEAR.	Total ounces of Gold extracted.	Stuff crushed.	Yield per ton of 2000 lbs.	Total days labor.	Average yield per man per day in dwts., at \$0.90.	
	Oz. Dwt. Gr.	Tons.	oz. dwt. gr.		Dwt.	\$
1862	1,688 0 0	835	2 0 10	12,792	2.63	\$2.86
1863	3,718 2 19	3,644	1 0 10	36,688	2.02	1.81
1864	4,033 3 7	4,136	19 12	22,984	3.50	3.15
1865	2,200 5 14	3,833	11 11	16,588	2.65	2.38
1866	1,012 8 4	1,881	10 18	8,814	2.29	2.06
1867	845 18 14	1,670	10 3	13,390	1.26	1.13
1868	1,248 6 3	2,938	8 12	23,166	1.00	.90
1869	719 8 19	2,726	5 6	20,462	.70	.63
1870	914 15 14	2,356	7 17	8,034	2.27	2.04
1871	1,538 6 16	2,927	10 4	11,232	2.74	2.46
1872	2,572 10 18	2,305	1 2 7	8,840	5.82	5.23
1873	2,000 0 3	2,267	17 15	12,688	3.15	2.83
1874	623 11 6	1,193	10 14	5,605	2.26	2.03
1875	492 11 22	1,140	8 15	3,942	2.49	2.24
1876	1,217 19 7	1,929	12 15	7,848	3.10	2.79

## OTHER DISTRICTS.

YEAR.	Total ounces of Gold extracted.	Stuff crushed.	Yield per ton of 2000 lbs.	Total days labor.	Average yield per man per day in dwts., at \$0.90.	
	Oz. Dwt. Gr.	Tons.	oz. dwt. gr.		Dwt.	\$
1862	436 0 0	75	5 19 10	6,864	1.26	-\$1.13
1863	141 3 2	225	12 13	6,552	.43	.38
1864	66 12 0	38	1 15 0	4,992	.27	.24
1865	47 3 8	102	9 6	2,470	.38	.34
1866	248 10 19	250	19 23	4,550	1.09	.98
1867	39 6 17	16	2 9 3	4,992	.15	.13
1868	316 6 22	518	12 15	12,636	.50	.45
1869	424 12 15	761	11 3	15,444	.54	.48
1870	378 5 15	812	9 7	7,956	.95	.85
1871	112 2 16	281	8 0	2,808	.79	.71
1872	402 0 13	2,552	3 3	5,668	1.41	1.26
1873	407 9 13	3,175	2 13	4,550	1.79	1.61
1874	622 16 18	3,212	3 21	7,327	1.70	1.53
1875	354 0 1	676	10 11	3,441	2.05	1.82
1876	85 7 13	97	17 14	1,474	1.15	1.03

## FINANCIAL STATEMENT.—GOLD.

*Mines Department, for 12 months, ended December 31st, 1876.*

RECEIPTS.				EXPENDITURE.			
DISTRICTS.	Rents.	Royalty.	Totals.	Return of Rents.	Royalty Commission.	Salaries and Surveys.	Totals.
Caribou.....	\$ 84 00	172 68	256 68	.....	6 55	.....	6 55
Fifteen Mile Stream.....	.....	69 86	69 86	.....	.....	.....	.....
Gay's River.....	4 00	84 64	88 64	.....	4 97	.....	4 97
Lawrencetown.....	.....	16 77	16 77	.....	40	.....	40
Montagu.....	64 00	62 25	126 25	.....	3 72	.....	3 72
Oldham.....	44 00	682 22	726 22	.....	22 17	220 52	242 69
Ovena.....	10 00	1 42	11 42	.....	07	.....	07
Renfrew.....	210 00	20 12	230 12	68 00	43	75 00	143 43
Sherbrooke.....	26 00	1826 60	1852 60	.....	85 57	748 00	833 57
Stormont.....	16 00	29 65	45 66	23 36	91	297 70	321 97
Tangier.....	6 00	52 83	58 83	.....	.....	.....	.....
Uniacke.....	20 00	78 68	98 68	.....	3 93	.....	3 93
Unproclaimed.....	44 00	.....	44 00	.....	.....	54 50	54 50
Waverley.....	12 00	569 46	581 46	.....	30 95	.....	30 95
Wine Harbor.....	70 00	419 44	489 44	3 95	21 11	471 00	496 06

## OTHER THAN GOLD.

*Mines Department for 12 months, ended December 31st, 1876.*

COUNTIES.	RECEIPTS.				EXPENDITURE.		
	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Return Licenses to Search.	Surveys.	Totals.
Annapolis.....	\$ 20 00	50 00	.....	\$ 70 00	.....	.....	.....
Antigonish.....	640 00	.....	.....	640 00	20 00	.....	20 00
Cape Breton.....	580 00	375 00	19,547 88	20,502 88	60 00	.....	60 00
Colchester.....	280 00	.....	1 10	281 10	.....	.....	.....
Cumberland.....	540 00	275 00	7,315 59	8,130 59	.....	81 50	81 50
Guysboro'.....	440 00	50 00	.....	490 00	.....	.....	.....
Inverness.....	140 00	75 00	.....	215 00	20 00	.....	20 00
Lunenburg.....	20 00	.....	.....	20 00	.....	.....	.....
Pictou.....	540 00	325 00	23,542 41	24,407 41	.....	.....	.....
Richmond.....	.....	50 00	.....	50 00	.....	.....	.....
Victoria.....	80 00	50 00	.....	130 00	.....	.....	.....
	\$3,280 00	1,250 00	50,406 98	\$54,936 98	\$ 100 00	81 50	\$ 181 50





REPORT  
OF THE  
Department of Mines,  
NOVA SCOTIA,  
FOR THE YEAR 1877.

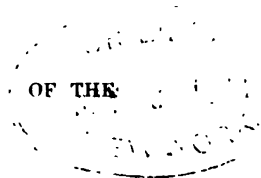
---



HALIFAX, N. S.:  
PRINTED BY THE NOVA SCOTIA PRINTING COMPANY  
1878.



# REPORT



## Department of Mines,

NOVA SCOTIA,

FOR THE YEAR 1877.



HALIFAX, N. S.:

PRINTED BY THE NOVA SCOTIA PRINTING COMPANY,  
1878.



# CONTENTS.

---

	Page.
Summary of the Mineral Produce in 1877.....	3
Late Changes and Improvements in Mining Practice.....	4
Infractions of the Mining Law.....	6
Prosecutions under Chapter X, R. V., 1874.....	7
Irregular Returns.....	9
Boiler Explosions.....	9
"    Scale.....	15
Submarine Workings.....	17
Coal Mining in 1877.....	25
Cumberland County.....	27
Pictou.....	29
Cape Breton.....	32
Other Counties.....	36
Gold Mining.....	37
Iron Mining.....	43
Manganese Mining.....	46
Lead Mining.....	47
Copper Mining.....	48
Quarries—Gypsum, Barytes, Freestone.....	50
"    —Limestone.....	51
Petroleum.....	51
Accidents in 1877.....	52
Tables to be found in previous Reports.....	58
List of Mineral Leases other than Coal.....	59
"    Coal Leases and Lessees, &c.....	60
TABLES.—COAL.—Trade by Counties.....	65
General Statement.....	67
Colliery Production.....	68
"    Labor, &c.....	69
"    Construction Account.....	70
Intercolonial R. R. Trade.....	71
"    "    Coal Consumption.....	72
Miscellaneous Notes.....	72
GOLD.—General Statement, 1877.....	73
District Statements.....	74
Financial Statement.....	78



# DEPARTMENT OF MINES.

---

## REPORT

FOR THE YEAR 1877.

---

*To His Honor the Honorable ADAMS GEORGE ARCHIBALD, C. M. G.,  
Lieut.-Governor of Nova Scotia, &c., &c., &c.*

MAY IT PLEASE YOUR HONOR:—

The undersigned herewith begs to present to Your Honor the Annual Report of the Inspector of Mines, together with statistical information, compiled from official and other returns made to the Department of Mines, for the year 1877.

ALBERT GAYTON,  
*Commissioner of Public Works and Mines.*

Halifax, February 11th, 1878.





# REPORT

## ON THE

### Inspection of Mines in Nova Scotia,

*For the Year ended 31st December, 1877.*

By HENRY S. POOLE, F.G.S., ASSOCIATE OF THE ROYAL SCHOOL  
OF MINES, &C.

HALIFAX, February, 1878.

SIR,—I beg to submit the following Annual Report on the Mining Industry of the Province for the past year. It embraces besides matters connected with inspection, comments on subjects of interest to the Government as mineral owners as well as to the industry in general, and also statistics of operations conducted outside of Crown reservations.

A tabular view of the mineral output of the past year appears as follows:—

#### SUMMARY, 1877.

Minerals.	Quantities	Greatest Previous Production.	
		Quantities.	Years.
<i>Metallic.</i>			
Gold.....ounces.	16,882	27,314	1867
Iron Ore.....tons.	18,603	15,274	1876
Manganese Ore....."	97	300	1865
Copper....."	285	45	1876
Lead....."	11	6	1876
<i>Non-metallic.</i>			
Coal....."	757,496	1,051,467	1873
Gypsum....."	107,506	120,693	1873
Freestone, &c....."	9,343	8,829	1874
Limestone....."	6,726	4,860	1875
Barytes....."	23	1,103	1869-70
Moulding Sand....."	160	300	1874

Comparing this summary with that of the preceding year, its general appearance is not unfavorable.

## MINES REPORT.

---

1.—The districts of Sherbrooke, Oldham and  
exceptionably well, the total produce of the  
per cent.

2.—The Iron Works at Londonderry being  
led for an additional output of 3000 tons  
the current year, will require a further in

MINING.—Though this branch of the mining  
a small scale only at Teny Cape, it is satis

NG.—A most promising deposit of ore has  
and had it not been for litigation, the quan  
larger, and the extent of the deposit bet

3.—has not yet passed beyond the prospecti  
embrooke.

G.—Though the output for the year is  
business is still as depressed, in consequ  
ed.

-METALLIC MINERALS.—As no returns are  
quarries, except in the case of freestone, the  
e compiled from data courteously supplied  
, and are comparable with those of prev  
f gypsum are probably correct, those of fre  
but as quarries of the two latter supply  
is unknown, the produce credited to them  
mplete.

---

D IMPROVEMENTS IN MINING PRACTICE IN  
—A review of the mining practices of  
ears ago is not without interest. Among th  
rs in the country, and the appliances found  
abroad which have been adopted, may

as been improved in the mines consequ  
the Mines Regulation Chapter, which was  
the Province in 1873.

or minerals has been facilitated by the  
In former Reports the depths and cost of  
and Cumberland Counties were given; and  
ving measures and in tapping water for art  
further record of efficiency in this drill wi  
is Report under the heading Picton Count  
l free-fall cutter was successfully practised  
t Lake Ainslie to a depth of 1600 feet  
een introduced at the Joggins, and the elect  
Sterling pits at Glace Bay.

---

High Explosives, dynamite, lithofracteur and rendrock have proved invaluable in sinking in hard and wet ground, and especially with the aid of a battery. The general use of dynamite is believed to have been chiefly instrumental in reviving the gold mining industry.

Fans have replaced furnaces for controlling the ventilation of the Foord and Drummond pits. Warming the intake has been practised in winter to prevent the formation of ice on the guides in the Foord pit and on the rails of the Vale slope.

Pumping.—Direct-acting steam pumps have been very generally adopted for unwatering dip workings, and they were used in sinking the Gardener pits. The adoption of these pumps in pits where the standage is small and the water quick is a change of doubtful value. But further economy has been effected and a great objection to their use removed by turning the exhaust steam into the suction. One of these pumps at the Nova Scotia Colliery now forces to a vertical height of 765 feet through 1600 feet of pipe.

Boilers have been fitted at Sydney and Gardener with water indicators besides the ordinary glass gauge-cocks; at Emery with a scum collector, described elsewhere in this Report as very efficacious for preventing scaling and pitting of the plates; and at Acadia with furnaces contrived to utilize the refuse duff or dross of the coal by aid of the steam jet, whereby an estimated saving of some \$3,000 a year is effected. One of Jukes' self-feeding furnaces is in use at Sydney. Nearly all colliery boilers are now shedded over for protection from the weather, and for the comfort and health of the stokers.

Forewinning the Coal, or adapting Bord and Pillar Workings to the entire removal of the pillars within a few years.—This system might be more generally and advantageously practised than it is. It is most systematically conducted at the Joggins and Spring Hill in Cumberland, in the workings of the Acadia and McBain seams of Pictou, and at Gowrie in Cape Breton. The great extent of lost and wasted pillarage in some pits suggests that temporary expediency and easy indifference has indefinitely postponed the introduction of a system that at first and until workmen are skilled and accustomed may give some additional trouble and anxiety.

In the Handling of Coal, to prevent breakage at the bank-head, tubs with doors are in common use, and to affect the same object and yet keep to the ordinary square boxes, which have many advantages over tubs with doors, a tipping cradle, described when directly referring to Sydney Mines, has been there adopted. Fowler's clip-pulley on self-acting inclines at Caledonia and Gowrie. Tipping platforms for flat-bottomed wagons fitted with doors at the new pier at North Sydney and at the Sydney pier of the Cape Breton Company; telescopic shoots at Caledonia and Sydney; while ordinary shoots are now generally preferred to the primitive and destructive 'drop.' Incline roads at the staiths to facilitate the handling of empty and full wagons. Revolving screens are in use at Spring Hill and the Joggins for cleaning and otherwise treating slack coal.

Closely allied to the preparation of slack is the question of the consumption of this waste product both in colliery and domestic uses. The former has already been mentioned, the latter has been extended by the introduction of Soft Coal Base Burners, the latest form of which

is the home-made Argalia, manufactured by the Windsor Company. This stove is much on the same principle as the described two years ago. It is meeting with general favour in the country, and although only introduced late last year, some have been disposed of. The company expect to make between 200 and 300 of these stoves this year, as they are capable of utilizing ordinary coal. That of Spring Hill, for instance, selling at Windsor for £10 per ton.

At Sydney Mines it is proposed to introduce during the year several late inventions. To apply to one of the high pressure engines for trial a Davy's Separate Condenser, which is said to be at small cost to save 12 pounds of steam. To have the new New Winning attached to the ropes by Fowler's Safety appliance which Mr. Bell, one of H. M. Inspectors of Mines, has given in terms of unqualified praise. In England it is now seriously proposed to make the use of Safety Hooks compulsory, to prevent accidents from overwinding. To weigh the coal, from the cutters, on the head by a Billy Fair Play, an arrangement by which discrimination is made between good and poor colliers, the skilled workman being paid proportionately to his skill by having two prices for round coal, both being weighed *after* separation. A new kind of pick has already been introduced which is liked by the cutters. It is called the Universal. Its merits are portability and truth, one handle serving for a number of picks, as all are so uniformly made that they are interchangeable. The picks are made of cast steel of good quality and do not blunt as readily as the common pick. Care has, however, to be taken in the sharpening not to heat the pick above a cherry red.

Other improvements may be looked forward to being introduced, as the use of coal-cutting and wedging machines; self acting brakes; balanced engines; hydraulic engines; extensive underground haulage by ropes, &c., in place of animal power; improved signalling by speaking tubes, electricity, or the telephone, the last way, has been tried at Caledonia, but without the effect absolutely necessary to attract attention when practically used.

Rock boring machines have been used at Montagu and at Waverley, and a hand power borer, the "Victor" at Waverley.

---

INFRACTIONS OF THE MINES REGULATION CHAPTER. In the reports references were made to the inattention sometimes shown to the requirements of the mining law, and to the neglect and apparent ignorance, which, if remedied when noticed, might be regarded as excusable when it had not resulted seriously; it was suggested that clemency might possibly be carried too far, and that instances for contravention become to be expected as a matter of course, hence that an example or two, of wilful offenders, would be in order that *all* engaged in mining might the better realize that the law requires exactly what it states, and allows of no infraction under pain of penalty.

Impressed with the safeguards which a strict compliance

---

the manager whom calamity overtakes and the danger to which it exposes the careless, the advantages of a proper reading of the law and fulfilling its demands by care and good discipline, have been strongly dwelt on in personal dealings with miners even to some-time occasioning individual irritation. In which case the following propositions have been submitted, and the question asked; which would be the most considerate course to pursue:—

Either institute actions for every neglect as the law sanctions; or, only point out the law as one that should be complied with, and have it forgotten till a fatality consequent on a glaring neglect subjects the manager to an action for man-slaughter; or impress the advisability of strict compliance if need be "with all the insolence of office" in cases where matters and practice were observed to be disregarded?

Nor would it be well to overlook that notices of individual neglect have produced beneficial effects, and that exposures have a deterring influence perhaps as salutary in cases of mere inobservance as legal actions would have. Yet, while additional attention to the details of the mining law was noticeable during the past year, there still was apparent an inability to see the necessity, much less the advantages, attending strict compliance—except it might be in a neighbor. So strong was this inability expressed in two cases that came to my notice, that the alternative of legal proceedings alone brought compliance. In one case this view of the law's requirements failed, and an action before two magistrates had consequently to be brought under circumstances which will be shortly mentioned. On the other hand there are managers who better realize the bearing of the Mines Regulation Chapter, and who feel that to protect themselves they must maintain good discipline among their deputies and men. Being made primarily responsible by the act it is incumbent on them to show, "in the event of any contravention of, or non-compliance with any of the rules, by any person whomsoever, that they had taken all reasonable means, and to the best of their power enforced the rules," which can only be done by requiring strict obedience and by punishing wilful offenders. Having this object in view, two actions were brought against working men in Pictou County.

**PROSECUTIONS UNDER THE CHAPTER.**—In October the public prints of Cape Breton stated that two lads had been run over in the slope of the Clyde Company's workings at Glace Bay, and that one was so severely injured that he was not expected to recover. No report of such an accident having been received, the manager was written to, advised that if the report were correct he had made himself liable to an action for neglect of section 16, and he was requested to immediately report the occurrence. He replied:—"In regard to the accident you made mention of, it was so trifling that it would not be worth reporting. The boys were standing on the landing when the empty tubs went down, and were struck by the tubs and slightly scratched." As this view of the matter did not tally with accounts received from three correspondents and the oral statements of residents of the locality, the manager, Mr. Sutherland, was written to again and informed that if he immediately sent a full and correct account of the accident, no action would be brought against him on

that count. This second opportunity to amend his neglect and the penalty for non-compliance produced the following response: "I would say that I sent you an account of the accident and have nothing more to add."

This refusal to answer an inquiry legally demanded (see Section 31) made it appear that in all probability there was some mistake. Then as his imperfect statement did not agree with the report, and as the law had been wilfully set at defiance there was no other course to pursue, and no other way to get at the facts of the case than to bring an action. It being understood that the case was of such a character as to require reporting, the action was brought for non-compliance with section 16, and as one cause of the accident appeared to be due to the inefficiency of the rapper at the bottom of the slope to warn the bottomer that a rake was away, a second cause was laid for non-compliance with the 10th general rule, a third cause was also entered for neglect to have the names of the inspectors and manager appended to the abstract. This was added for the purpose of showing that every requirement of the Chapter must be complied with.

The evidence submitted proved that the lads had been sitting at the turnout guard at the slope bottom, and on hearing the rake had jumped up but were overtaken by the tubs, knocked down and wounded. Both had to be carried out of the pit, and one died from a wound that the medical man partially probed. At the hospital the doctor expressed a very guarded opinion as to the result of the operation on the wounded lad, and advised the manager to report the occurrence. Subsequently the lad rallied from the shock, and it soon appeared that he was in no danger.

In the defence great stress was laid on the accident being subsequently not to be of so serious a nature as at first feared. The question at issue was, what it appeared to be within the first instance, and not what in time it really proved to be. The magistrates took this view of the case; and as it was represented to them that the action was brought only for the purpose of enforcing the law which was wilfully set at naught, and that it might be an example to others, they imposed a merely nominal fine with costs. Had the prosecution been non-suited on the ground that the personal injuries were not serious, and that was the defence, further action would have been taken under section 20, to show that the inspector had a right to require the information he sought. The section reads that the inspector "shall have power, *inter alia*, to make such inquiry as may be necessary to ascertain whether the provisions of the Chapter are complied with, \* \* \* and make inquiry respecting all matters and things connected with, or relating to the safety of the persons employed, \* \* \* every owner, agent and manager who refuses or neglects to furnish to the inspector the means necessary for making any entry, inspection, examination or inquiry, shall be guilty of an offence against the Chapter. The full wording of this section is evidently intended to cover every imaginable case that might arise, and to assist the inspector in obtaining full information upon every matter which he thinks requires elucidation. Any contrary or restrictive interpretation should be tested to the uttermost.

The prosecutions in Pictou County were instituted for infractions of the 2nd and 5th General Rules. In one case, at the Vale, a miner followed into his room another who was sent to brush cut a capful of gas, without waiting until the place was reported to be safe.

In the second case a workman would not wait at the appointed station, in the Acadia Pit, until the deputy reported, but pressed on into the workings. To enforce his authority, the manager brought an action against the man, rightly judging that if he countenanced a wilful disobedience it would appear to his disadvantage in the event of any inquiry at which he desired to show that he had "enforced to the best of his power" strict discipline in his mine. In both cases the men were fined.

These actions have had a salutary effect on both managers and men, and it is to be hoped will suffice to arouse that attention and discipline that is required: as was before remarked, the great object of the laws' regulations is to improve the mining practice rather than to punish infractions.

---

RETURNS.—While the returns from the collieries are transmitted with tolerable regularity, those due from gold mining districts are not so much so as is desirable. This is perhaps to be partially accounted for by the difference in the business habits of the two classes respectively engaged; still it is not irremediable. There has also been noticed a laxness on the part of some mill licencees, of some too flagrant to be overlooked. In one case the returns did not tally with the entries in the mill-book; in another case an inspection of the book showed that the entries had not been regularly made, April followed May, and an entry for March only subsequently appeared after an enquiry had been instituted. As an excuse the owner wrote that he had left the mill in charge of somebody else, and that he had not himself been in the mill so far that year. Yet he had taken the following oath, "I, —, of —, being the person principally employed in keeping on the premises at —, used as a Licensed Mill, and whereof I am the licensed mill-owner, the book of accounts prescribed by the Chapter of the Revised Statutes relating to mines and minerals, do hereby swear that the above is a true and correct copy and extract from said book of all the original entries therein tending or referring to the parcels of quartz crushed or reduced at said mill, in respect to which payment of Royalty has this day been made." These cases are noticed to show to what an extent the affirmations to returns may be regarded as mere matters of form, and in the hope that this public mention will suffice, and no future opportunity be given to publish the names of inattentive owners and agents.

---

BOILER EXPLOSIONS.—"Had I considered the matter at all, I would have thought that the makers knew what was customary for the safety of sets of boilers, and attached the necessary safety-valves, &c." Such was the reply received to a notification that, *inter alia*, one safety-valve, and that festooned with broken castings, was not





Boilers are variously designed to serve different purposes. It may be desired that one have ample steam space, while that another generates steam rapidly, or the consumption of fuel may be a matter of indifference, say at a colliery, or of the utmost importance as in a steamship; a crowded city may demand an economy of space, a matter of no moment in the country. A boiler of the latest patent, with complex fittings and the most approved appliances, may prove economical in the hands of a skilled engineer, if near the shop from which it was issued, but far otherwise in out of the way districts, where other than simple repairs cannot readily be affected. But where boilers are entrusted to men of inferior skill, as they so often have to be, it is felt that the simpler the form and appliances are the better, and the less is the liability to derangement.

The well known axiom, that a chain is no stronger than its weakest link, is also true of boilers; they are no stronger than their weakest point. To find out the many weak points in the construction and management of boilers, and to solve the problem how explosions may be prevented, has been the aim of the several associations established of late years, for the inspection and assurance of steam boilers.

In the early days of steam, when condensing engines were alone used boilers were not required to withstand a heavy pressure, they rarely burst. But on the introduction of high pressure engines, and when the reluctance which was at first felt, to use so powerful an agent, had disappeared, it seemed as though the enormous force stored up in steam of high pressure, was lost sight of, and with the numerous modifications of form and fittings instituted, and blindly copied without due regard to the conditions involved for safety with economy, explosions became frequent.

To account for them mysterious influences were invoked, electricity, the decomposition of steam into its elements, the spheroidal state that water assumes on red hot plates causing a sudden formation of steam on a reduction of temperature, the effect of turning the cold feed water upon red hot plates, or the destruction of the *skin* of the iron plates. This belief in mysterious causes is not yet eradicated from the popular mind; but how much there is of mystery about explosions can best be weighed after examining the results of steam boiler inspection. There is first to be considered the amount of force pent up in an ordinary boiler, and the explosive energy developed at the moment of rupture. According to Professors Airey and Rankine, one cubic foot of water at 60 pounds pressure, equals in explosive energy one pound of common gun powder. At the pressure of 60 pounds water has a temperature of 295°, in fact is, for the most part, steam in a liquified state, ready, on release from its bonds, to flash into the gaseous state. Water becoming steam at a temperature of 212°, expands 1696 times, and under 60 pounds pressure in a boiler about 470 times. In a case of rupture of a containing vessel, the sudden expansion of a small volume of water into steam, drives back the surrounding air that it displaces. This displaced air acts by atmospheric impact on surrounding bodies, and its destructive force is increased nearly equal to that of its expansion by its immediate return to its original position, on the condensation of the steam. If instead of a rupture the safety valve be opened, the store of heat and its equivalent force in the



accompaniment of the use of steam. Since 1865 each boiler enrolled has been guaranteed for £500, and since then, although 25,000 guarantees have been issued, only one boiler of those insured has exploded, and that from the owner having heavily charged the boiler with an anti-incrustation composition and forgotten at the same time to blow off. In the engineer's report for 1876 he showed that 30 explosions had occurred in England that year and caused the death of 88 persons. Of the 30 only 3 arose from shortness of water, and he called attention to it because, he said, "There is a great tendency to attribute the majority of explosions to this cause, and thus remove the onus to the boiler attendant, and to show that these disasters are not preventible." The explosions from shortness of water, moreover, were not severe, and but one person was killed by them. In England there are three other societies similar to that of Manchester, in Germany seven, in the United States the Hartford Company, and its Canadian offshoot at Toronto.

The Boiler Insurance and Steam Power Company of England have about 15,000 boilers under supervision, and make between 50 and 60,000 annual inspections. Of the explosions that occur the engineer states that by far the greater number take place at iron works and mines, that about one-fourth of the whole are due to the negligence of attendants; the remainder, or most of them at least, are the results of defects of construction or condition which could not have escaped the notice of an efficient inspector, and might therefore have been prevented.

The Hartford Company report that during the last ten years 1768 persons were killed and 1904 wounded by 848 explosions in the United States. During the same period the company made 150,042 separate examinations and exposed 16,764 dangerous defects. They now employ twenty-seven inspectors, who devote their whole time to their service. Of the boilers insured by the company, 18 exploded and killed 15 persons. All were accounted for and were due to the attendants or boiler-menders having neglected some ordinary precaution. Four of them were iron work boilers fired by the waste gases; they were improperly hung, being suspended only at the ends and in the middle. For thus suspended, the curvature due to expansion throws the weight entirely on the central support, and when the hanging gives way the boiler breaks. Boilers even fifty feet long have been thus hung, while they should have a support at least every ten feet. Another of the explosions was caused by the water getting low while the piston was being packed of the engine which also drove the plunger; on starting the crown sheets came down. A sixth burst four hours after some repairs had been effected from the neglect to remove a wooden plug temporarily inserted in the steam-pipe jug and forgotten. The rule of this company is to take one-sixth of the bursting pressure as the working pressure, or one-half of the actual test.

The Canadian office has been a separate organization for over two years, and is fast extending its field of operations. Already there are in Nova Scotia some eighteen firms who insure their boilers. Over 200 are thus insured throughout the Dominion, and so far without accident. The rate is 1½ per cent on sums up to \$10,000, covering damage to the boilers and surrounding property.

The numerous defects inspection has disclosed clearly demonstrate that careful periodical examinations are necessary to indicate indications of weakness before it is too late. Internal inspection is requisite to expose grooving, pitting, cracks between rivets, and corroded stays, and incrustation over the fire surfaces. The causes of defects may be mentioned the use of drift pins and holes in sheets coincide, by which fractures are occasioned from a hole or to the edge of the plate: then a laminated structure of sheets causes them, not being homogenous, to be bad conductors of heat, and leads to overheating. Neglected leaks, setting nozzles below the water line, insufficient bracing and faulty construction besides scale, sediment, and corrosion, all lead to trouble. Horizontal boilers are apt to be deficient in important fittings, though made of good material. A cheap vertical boiler without hand holes for the removal of scale and sediment; cheap cylindrical boilers, with man holes strengthened, if at all, with iron instead of wrought.

Regarding the periodical examinations that are essential for the safe use of steam boilers, the desirability of having those incompetent to inspect them has been dwelt on as a great safety. The efficiency of even trained attendants, unaccustomed to examine boilers in every stage of weakness and decline, to accurately judge how long a veteran boiler can be run with safety, or a strained one can be strengthened, may be doubted; and just as doctors in medicine devote themselves specially to the study of our common ailments and their repairs, while we ourselves are the most incompetent in keeping them in good running order, yet neglect or overstrain them, and seek for the doctor's examination and advice, so it is most probable, however good an idea an attendant may have of the requirements of his boiler, that it is better to leave the examination to those who make them a special study and a constant occupation. That all boilers should, at least once a year, be carefully inspected, every part appears most plainly necessary from the records of various boiler insurance companies. Endeavors have consequently been made in England to have inspection made compulsory. In 1870 a parliamentary committee took opinions and evidence on the subject, but could not then recommend government inspection, lest it should take away responsibility from the owners. Interested parties do not however despair of having some measure on the subject passed; at present the views of the different associations are somewhat conflicting as to the mode which should be adopted. The Society of Manchester recommends that a competent Court of Inquiry should investigate every case of explosion, in order that the responsibility may be put on the right party. In the case of insurance companies they say: "Our requirements on the discovery of defects are not needed, or our responsibility ceases." In the case of municipal government inspection, the owner or manager can dissent from the requisition and have his case reviewed before a competent Court of Arbitration. So it seems possible government inspection could be conducted and relief for oppressive interference from arbitration.

This subject has perhaps been gone more fully into than most

---

warrantable in a report of this kind, but as it will fall into the hands of many who have to do with boilers, and who hardly know how to go about to acquire the information their inexperience wants, the several matters touched upon have been mentioned, that attention once called to them further inquiries may the more easily be made.

Before quitting this subject a few words may be added on the mysterious skin of iron, and on boiler incrustation the bane of the steam user.

To break a bar even of good iron it is only necessary to cut a nick with either cold chisel or file, and a smart blow breaks it off; but according as the nicking is partial or complete, various crystalline and fibrous fractures it is noticed are produced. It is unnecessary here to do more than refer to them, and to state that they have been explained by the experiments of Kirkaldy, and others, and to add that by plaining out the nicks the tendency to break short off is removed though the bar be in consequence reduced in size. The skin of the iron bar is not then a source of strength, and its destruction the cause of the weakness at the line of nicks. Its bearing on the matter in hand respects the chipping to which the edges of boiler plates are subjected, and the scratches or channels consequently made in the plates by the chipping tool even when in the hands of skilled workmen. The channels and scratches unintentionally made by the chipping tool tend to weaken the plates, and make them susceptible to fracture, as do the nicks intentionally made in the iron bar. To avoid this source of weakness many makers now plane the edges of the plates.

Incrustations.—Scale.—Little of the water available for steam raising is comparatively pure, it all contains some matter either chemically dissolved or mechanically suspended, which is by boiling concentrated or separated out.

The more common substances dissolved in it are the carbonates and sulphates of lime and magnesia and salt. Waters containing carbonates are called "temporary hard," and those holding sulphates in solution "permanently hard."

I. Spring water depends on the composition of the rocks from which it flows for its degree of purity.

II. Surface waters contain large quantities of organic matter, besides mineral substances extracted from the rocks and soils over which they flow.

Ebullition then concentrating the foreign substances contained, the water soon becomes muddy, and unless it be renewed the sediment which is at first thrown to the surface is finally deposited, and is burnt on the plates just as unstirred porridge in a kettle. To escape incrustation in a steam boiler is quite exceptional, and various treatments have been proposed for the removal of scale after its deposition, but it may be accepted as an axiom that the proper treatment is to prevent its formation. Of the many substances tried for loosening scale after formation the more common are soda ash, ammoniac chloride and ammoniac carbonate, and glutinous matters as horns and hoofs. To prevent the deposition of scale, the water is subjected to a preliminary treatment varying according to its constituents. For softening calcareous waters, Dr. Clarke's method is preferred, which is by the addition of lime water to change the soluble acid calcic-



Mr. Rumble, so modified and improved it that he has applied for an patent for an Improved Boiler Cleaner and Feed Heater.

It may be described generally to consist of a 2 inch pipe, leading from near the bottom of the back end of the boiler, up to an 18 gallon receiver, placed above the boiler and about over the fire-bridge; from the receiver pass two pipes, one to the open, and the other directly downwards through the shell to low water line, where it branches into two transversely placed bell mouths, each having a diameter equal to the difference between high and low water in the boiler. The circuit being made by the necessary valves, a current of water flows through the system in a contrary direction to the order of the above description. Then, as the strongest ebullition occurs where the bell mouths are placed, the scum in the water is thrown to the surface and passes up into the receiver, where it necessarily settles, and from whence it is periodically blown out through the second pipe.

Mineral Oils for Lubricating.—The corrosive action of vegetable and animal oils on iron, when they are acted on by high pressure steam, and decomposed, is well known. Admitted into the cylinder of a high pressure engine for lubricating purposes, these oils become rancid and corrosive, consequent on the fatty acids being separated from their bases and freed to act injuriously on the iron. But mineral oils being without oxygen in their composition, are free from this objection, and as they can be prepared as lubricants for both heavy and light work, and to equal, if not excel organic oils for general use, it is surprising they are not more commonly used. In price, they compare favorably even with tallow. For the large winding engines at the Foord pit, Mr. Hudson speaks in terms of high praise of the quality sold as Valvoline.

Petroleum has also another advantage over organic oils. When the condensed steam carrying the lubricant from the cylinders, is returned into the boiler, it is apt, if an organic oil, to cause foaming in the boiler, not so with a mineral oil, which in addition, is said to be beneficial in the prevention of scale.

---

SUBMARINE WORKINGS.—There is a popular fallacy that our coal resources are inexhaustible; it is even sometimes asserted that our coal measures cover 18,000 square miles. When it is remembered that that number represents the full area of the Province, a statement that our workable coal fields above high water mark, do not embrace one sixtieth of that area, will not seem so surprising, or that the figures enumerating the available contents are easy of expression. Few probably are aware how restricted is the Pictou field; so far as proved, its total output, could not do more than supply the trade of Great Britain for four years. If then, the land fields are limited, the greater is the necessity for looking after the sea areas, which sooner or later will tax engineering skill to the uttermost.

The coast sections of Cape Breton and the Gulf shore early demonstrated the probability that the existing coal measures are but remnants of immense fields that now lie submerged under the Atlantic and Gulf of St. Lawrence. Outliers of the latter yet remain at George's Bay,





dislocations. The uniform slope of the sea-bottom also negatives a probability of the foreshore being bounded by heavy faults, but rather suggests that the area above water has been reduced by long continued denudation. The seams may thin out or deteriorate, but then again some that are thin and inferior along the crop may thicken and improve in quality to the deep. The proved seams on the land have only to be followed to show how much a seam may change its character and thickness within a mile or two.

As mining must, to a large extent ever remain a matter of accumulated experience, the subjoined information respecting past, present and prospective submarine workings on the English coast is given as of great practical value for us, and as suggestive for our guidance.

Sir George Elliott, who, from a trapper boy, rose by his own ability to be a member of parliament, and one of the most wealthy commoners and extensive coal owners of England, stated before the royal commission, already referred to, that in estimating the quantity of available coal under the sea along the coast of the County of Durham, a distance of only  $3\frac{1}{2}$  miles from the shore was taken, but that "he thought it is possible that a much wider extent will ultimately be worked by sinking shafts at a distance from the shore in the sea, especially taking into consideration that this portion of the coal field includes six seams of excellent coal, with an aggregate thickness of 30 feet. This would allow of a further distance, of say seven miles being worked." The Durham submarine field within the 10 mile limit, would then yield 2,200,000,000 tons. Sir George further stated that he actually had worked  $2\frac{1}{2}$  miles from shaft, and that he believed at great depths it would be possible to work 5 miles from shaft with shafts 10 miles apart. Respecting barriers between separate winnings, he thought it was not of so much importance under a great depth of cover as that it should not be allowed to take away the coal up to within a certain distance of the bed of the sea. "I feel," he said, "that there should be some mode of dealing with the subject, so that parties should not be permitted to work coal under the seas, rivers and estuaries in such a manner as to ruin and destroy a whole district."

Mr. W. Y. Craig, a mining engineer of high repute, when examined *inter alia* on the system of working under the estuary of the Dee gave the following evidence:—"We commenced at first working in the hard five-quarter seam upon the long wall system, and we opened off, leaving about 20 yards of pillar above the air heading; but we were obliged to abandon it. The dip of the measures is one in five, and we found that we could not get stuff to pack the roads without bringing it a considerable distance from the gob. The expense connected with keeping up the gob roads and the packings, caused us to abandon the long wall system, and then we commenced the ten yard drift, or what is commonly called Lancashire system. From each pair of up-brows we drove headings ten yards apart, and after extending those headings from 60 yards to 80 yards on each side of the up-brows, we took back the pillars, two on each side simultaneously. By that means we were able to do without timber, and we found this system of working best suited of any which we had attempted. The roof was very stubborn, and when in long wall working it did fall, it generally fell into the

## MINES REPORT.

a considerable loss of coal and expense in re-lift that intersected this, and the other seam of the sea, began at a depth of 135 yards, and the least cover was 100 yards. In the next seam working, all the coal was taken below where the cover was 100 yards. Another seam, the Durbog, was wrought on the narrow wicket system. The bords are driven 5 yards apart, and 1 pillar is left. The cut-throughs are about 20 yards apart. The system of working is adopted in order to bring on the sudden fall and fracture of the surface. After it comes on, the seam is abandoned for some time to allow it to settle, and then the bords are re-opened. None of the pillars are taken out, and 1 per cent. of the coal is entirely lost in pillars. It is not safe to work nearer than within 50 yards of the surface. In working this seam the intention was to come to long wall, but the cover was 100 yards of cover, and between that and 60 yards the narrow wicket system, leaving 44 per cent. of the coal. Beyond 60 yards with any description of work was not tried. The long wall which was tried in the lower range, was kept simultaneously going, and 40 to 60 yards apart, five yards being left on each side of the roadway. The pillars between each two stalls, which are worked on the narrow wicket system, are 10 yards apart.

For two falls there was a rapid discharge of water. In the bed of the river, at the thinnest part, there are 100 yards of silt, in another part it is about 40 yards. In the bed there is a strong bed of clay which is quite impervious. It has not been for that, Mr. Craig said, he would not have been going so near as 60 yards.

As to the question:—You heard the evidence as to the value of leaving pillars of coal, so that in the event of the sea coming on, any of these workings, the whole coal field might be saved. Do you concur in that opinion?

Mr. Craig replied,—“I think that in working under water, there is a degree of uncertainty as to what may be the result. In winning out new districts, it would be desirable to leave barriers.”

Mr. Forster, in his estimate of the quantity of coal that might be found in Northumberland and Cumberland, says that for a distance of eight miles on the Cumberland coast the seams of coal will be found under the sea, making 11 feet of coal over an area of 16 square miles. If the extent to be worked seaward 2 miles, and allowing for the loss, the available coal will amount to 101,376,000 tons. Mr. Forster on the Cumberland coast his estimate takes the extent to be worked seaward 2 miles, and along the coast from the shore 10 miles, and in this case allowing .25 per cent. for loss, there will be 403,200,000 tons.

Mr. Forster stated that he adopted the bord and pillar system at Whitehaven; that the face was 2 miles from the shore and 3 miles from the pit, and about 100 yards from the ocean in that particular spot, though the

worked at all depths from 60 or 70 yards downwards; the seam being 10 feet in thickness. The bords are driven 6 yards wide and the pillars are left 20 yards thick. The first working takes out in the whole 36 per cent, and about 16 per cent more is taken out when the pillars are merely cut through by 5 yard cross cuts, which is done down to a depth of 180 yards. Below that depth all the coal is taken out. At a neighboring colliery at Workington the sea broke in when the whole of the coal was being taken at a slight depth,—not more than 60 yards at the most. It is supposed a gravel bed communicated with the pit to the rise, and that it was not a fair break down of the strata. At Whitehaven the sea bottom is principally rock. Mr. Forster had worked large quantities of the Hutton seam on the Tyne, under the High Main water which was tubbed off, the High Main being exhausted and full of water with a vertical pressure from 70 to 100 fathoms. He was of opinion that it was desirable to have the mines under the sea worked in compartments; certain collieries on the Northumberland coast were with that view kept distinct, and it was proposed to keep a barrier of 40 to 50 yards between each sea face.

Mr. T. L. Cottingham, when describing his system of working under the estuary of the Dee, said the shafts were sunk on the shore of the river and tunnels were driven under it to intersect and work the various seams of coal dipping under it. The coal was worked on the bord and pillar system, the pillars being on an average 20 yards wide and the bords 9 feet wide. The length of the pillars varied from 40 to 50 yards; they were cut through at intervals of 30 yards and subsequently worked back. The depth of the shafts was 166 feet from the surface, and the coal was reached under the river at that depth and worked to the rise, to within about 30 yards of the surface, and practically all was worked out. The bed of the estuary was composed of sand and a stiff red clay, in some places 15 to 16 yards thick, which it was supposed would sink or subside, but would not break through; at any rate they never had the river water in upon them. Mr. J. J. Atkinson thought that  $2\frac{1}{2}$  to 3 miles is about the extent which it is desirable to attempt under the sea.

In the estimate of the available coal under the Firth of Forth, Mr. Geddes places it at 1,800,000,000 tons, and off the Ayrshire coast at 158,000,000 tons. Besides these submarine fields there is also a tract off the South Wales coast, which will, it is anticipated, produce a large quantity of coal. Considering then the great stake England has in submarine workings, we cannot do otherwise than regard the experience and expressed opinions of mining engineers and others so largely interested themselves in the future welfare of coal mining under the sea as of the utmost utility and value for us now, when precautionary measures may be easily adopted and their provisions recognized and strictly complied with.

Desirous of benefiting by the large experience of Mr. Richard Brown, late of Sydney Mines, he was written to on this subject April 27th, 1877. In reply he stated:— \* \* “In my opinion, wherever the overlying measures are perfectly sound and impervious to water, it will be quite safe to drive passage-ways in the seam under a cover of 100 feet, and to take out 50 per cent of the coal under a cover of

300 feet beneath the sea. When the measures consist chiefly free from slips there will be no danger, but where sandstones are generally traversed by open joints and cracks, predominate will be great risk of sea water finding its way into the workings. An instance of the latter I may mention the Jacobs pit at Sydney where, when the South levels reached within about 3 chains of the shore, there was such an influx of salt water through cracks in the sandstone roof, that we were obliged to shut off all the South workings by strong timber dams, although the thickness of the sandstone was 240 feet at the sea level. Again in sinking the new shaft at Lloyd's Cove a heavy feeder of salt water was met at a depth of 100 feet below the surface. Hitherto no workings have been carried on under the sea at Sydney with a less cover than 450 feet. At the Saltern pit, Whitehaven, (where I spent many a weary day some years ago), the uppermost of the three seams worked was 62 fathoms beneath the sea at the shore, under which it dipped at the rate of 1 in 10. Near the shore 36 per cent. of the coal was taken out, but as the dip increased to the dip, the pillars were split, and 28 per cent. was taken out, in all 64 per cent. Now, with a cover of 600 feet, the pillars are removed."

When the first Act relating to Mines and Minerals in this Colony was framed, knowledge of the lay of the coal seams of Cape Colony was not so general as it has since become through the labors of Lesley, Lyman and others. It was then deemed sufficient to leave the definition of any desired area to the individual discretion of the applicant, and merely restrict him as to its length and width. Consequently many areas have been taken out in irregular shapes with but little regard for local advantages. In fact, some are more inconvenient and unsuited for economical working than others would have been, had each field been laid off in squares without considering the line of outcrop of the measures. For land areas a system adopted answers well enough perhaps; but now that the general course of the coal beds is approximately known, and the value of those under the sea recognized it is most apparent that the present system is not best suited for the sub-marine. Instead of allowing distinct individuals to take out leases of areas, one beyond the other, it would undoubtedly have been better and more conducive to the interests of the country to have restricted each lessee to a narrow frontage on the adjoining coast, taking into consideration the position of the seams rather than a given superficial extent.

Private individuals holding such mineral rights as those granted by the Crown, would take care as far as possible, that known fields for access and advantageous working of the whole field should determine the boundaries rather than hap-hazard selection. The law now reads, the whole of an area can be forfeited for non-work, but not so a part that could not possibly be worked by other neighbouring lessee; and this matter is worthy of further consideration.

It is very certain that to work sea areas to the best advantage operators should be in the possession of the land adjoining, or at least a sufficient barrier be left unworked about their pits. In either case that the approaches should not be from workings in common with the shore line, lest water breaking into one panel should ge-

landwards, and destroy a whole district. Mr. Forster was of opinion that impervious barriers should be left on the land side or sea barriers would be of no use. In this respect our present law is not very explicit, though its general bearing is in accordance with the experience cited.

In England where the owners of small lots of land are often the owners of the subjacent minerals, thousands of acres of coal are computed by the Royal Commissioners to have been irretrievably lost on account of the awkward position of the lots, the irregularity of the holdings and the refusal of such owners to sell or lease at reasonable rates to those who, working adjacent areas, were at one time in a position to mine them profitably, but who, prevented by extortionate demands from entering on such lands, abandoned their pits. Thus the coal contained was for ever lost to the country, in that the separate lots are too small to warrant the sinking of special pits for its extraction. A waste from such a source in this country was in part met by the Crown reservation in grants of land of coal and other minerals, but warning by such experience may be had, and care taken that areas are leased of such shapes as may be most thoroughly and economically worked, if only the law will permit some discretion in the leasing to be exercised.

To avoid the difficulties which experience in England showed would militate against extensive sea workings, were no safeguards to be now interposed between selfish present interests and the future welfare of the coal industry, section 42 was inserted in the Mines Regulation Chapter of the Fourth Series of the Revised Statutes. Mining was already being conducted under the foreshore of Cape Breton without sufficient regard for the special requirements of the position, when the Legislature sanctioned the section in question. The section proposed to check further damage being done, and to so control incipient operations as to secure approaches to distant sections of the fields. Not that it is likely in our day that the coal lying at extreme depths and in remote districts will be required, or that colliery establishments will be in a position to work outlying sections profitably, but for the benefit of those who will come after us and who otherwise might justly reflect on our short-sighted policy and indifference to the country's future welfare. The coal required by the clause to be left in barriers may be regarded as not necessarily lost for ever, it is only reserved until all the available coal seaward has been won, when, if it be thought expedient, specified sections of the districts now reserved may then be removed. By the Act sections of coal are not destroyed or lost, but only reserved, while were no check put upon operations, instead of small barriers of coal being locked up as it were, whole districts undoubtedly would be endangered or irretrievably lost by a short-sighted system of "developing" property. Considering the extent of Cape Breton's submarine fields, and the shallow depths of many of the seams under water, with extensive croppings of valuable beds even into the sea itself, the extra inducements to pare as close to any prescribed limit as possible, with a consequent increased risk in case of infringement, make it not improbable that a greater thickness of cover than is at present stipulated for may be advisable to ensure

. The limit assigned in the act was suggested by the fact that on the English coast at Whitehaven, where the corals appear, by published sections, to be similar in character to those of Cape Breton. The experience under the estuary of the St. Lawrence service, since on our coasts there are no such tides, shows that a bed of silt to choke a crowning in should not be a limit of 60 yards of solid measure is excessive. On the other hand, for the risk is so disproportionate to the gain; if the loss realised can never be repaired, it is better to err on the side of safety. Further experience in pillar working in existing mines may dictate a wider margin as advisable for security.

To enable lessees of submarine areas to gain access to their property, the statute gives them a right to drive tunnels through the adjoining areas. The wording of the clause is so general that various constructions have been put upon its meaning, no authoritative interpretation having yet been given. The intention of the Legislature was to prevent jealousy or conflicting interest putting in a way of working areas lying under the sea. It is not the intention that the Legislature did not intend to go beyond the facilities to the one, to the inconvenience and detriment of the other. In granting the right to tunnel through the land area, the statute says, "doing as little damage as possible," meaning thereby that if there be one means of approach which will incommode less than another, although it may be the more expensive, that means, in preference to the cheaper, shall be adopted. In the case of a tunnel through a seam, it is proposed to tunnel through a mile or more seaward;—to drive in the coal would be more expeditious than to go through an equally serviceable stratum; or again, a slope in a seam might be preferred to a vertical shaft with a tunnel across the measures, would be more suited to the desired purpose. In the case of steep lying seams, the access to the coal, might, in some cases, far outweigh the inconvenience.

It may be occasioned the proprietor of the land area, from the fact that the rights were reserved, and therefore it might not be advised to grant the right to merely driving through coal or other strata, and in no case in the beds themselves. But in the case of a tunnel, the isolation of the approaches in the coal seam may interfere with the working of the inshore area, in fact it is difficult to foresee such a condition of affairs that would not be the case, but actually prevent the working of the inshore area, by cutting the area in two, and making the one side distinct from the other side distinct. It may fairly be presumed that the Legislature intended to incommode the prior lessee, nor to cause the loss of already won, as an interpretation sanctioning such a construction is not necessitate. The question might also be fairly asked, if the drifts within the limit of 180 feet connecting with the land or drowned out excavations, would not require a subjacent seam to be protected by the thickness of the drifts for security.

When the new Chapter was added to the Statutes which relate to the working of mines, the 40th Section respecting submerged lands was incorporated as bearing on a present necessity.

same time it was felt that possibly on more mature consideration some modification might be found advisable. The preceding remarks have been made, and authorities quoted on this subject that if possible it may receive due consideration and be fully weighed while there is time to protect the coal interests of the future from further damage, and that the public may see that the matter is not one of mere opinion on one system of working in preference to another, but is of national importance; further, it should be remembered that any restrictions now imposed can at the worst only act as a drag on the development of the coal industry, while the results of neglect or indifference, sanctioning a pennywise system, can never be remedied.

It was, however, felt when the sub-section 40 (3) was framed and submitted without protest on the part of our mining engineers that it probably would require amendment when the coal at great depths was to be won; though it was most essential to protect the frontage and to effectually shut off deep and extensive workings seaward from such as were shallow and liable to irruptions of water. The authorities quoted believe, and the practice at Whitehaven now safely carried on indicate that there is a depth at which all fear of irruption from above may be disregarded. At Whitehaven 60 fathoms is the limit. Mr. Brown and others are quite confident that at 500 feet all the coal can be removed with impunity.

Denudation has been mentioned as the probable cause of the small present size of our coal fields, the continuing action of the sea has therefore to be considered as an element of future insecurity. According to records at different spots along the coast, the rate of denudation appears to be irregular, and the present contour of bays and headlands would lead one to the same conclusion. At several places on the Cape Breton coast the roads have had of late to be moved inland, and the old tracks are even now half or wholly obliterated by the destruction of the cliffs; eight inches to a foot a year is probably the rate at exposed places. At the Joggings, an old plan shows that the rate has been about six inches a year. A large margin in barriers has consequently to be allowed to meet this element.

As bearing on this subject, on some future occasion, I propose to refer to the difficulties now encountered in deep mines and to those to be overcome at extreme depths.

---

## COAL MINING.

---

Although the total sales of coal in 1877 were nearly 53,000 ton in excess of those of the previous year, the outlook for the future is really no more encouraging for the competing collieries than it was a year ago; and the trade demands not yet being proportionate to the facilities for supply, the small increase has furnished little or no relief. The coal trade along the line of the newly-opened Intercolonial

Railway was not fairly established in 1876, and an increase with certainty be counted on in addition to the extra quantity required for the use of the railway consequent on its extension. The source, together with the further demands of the Steel Company of Canada, increased the land sales of the Pictou and Cumberland collieries 34,300. The requirements of the railway were estimated in the last Report at 65,000 tons, the actual quantity consumed last year appears in the appended table showing the traffic on the line of the Intercolonial Railway. Then in consequence of the combined action of the coal carrying railway companies of the United States, and the exceptionally low rates of freight in the Province, an excess of 46,582 tons over the shipments of 1875, more than the total increase, went to New York and New England for other purposes. So that while the land sales' increase could be counted on and the United States' demand regarded as exceptional in view of the heavy tariff, (though of possible continuance this year), the increase in these two branches over the total increase of the past season was met by losses in the Quebec and West Indian markets, the latter being more important to command, since they offer the largest fields for export. To Quebec the shipments were only one-half of what they were in 1875, and to the West Indies not one-quarter of those in 1875.

Our coal trade with the United States is always an important feature of the business. In former Reports tables were given for the exports before, during and since the Reciprocity Treaty was signed, and also of the wonderfully rapid increase of Canada's imports of free coal. Statistics for the year 1876-7 will be found among the miscellaneous notes.

The increase of the trade of the past year with the United States was partially due to the low rates of freight and to the combination that endeavoured to control the gas coal market in New York and New England. In and about New York 400,000 tons are annually required for gas-making, and New England 300,000 tons for the same purpose. Formerly England supplied the New York markets, but of late the railway companies have done so, drawing coal from beyond the Alleghanies. A year ago, in consequence of the stocks in hand being large and trade depression reducing the demand, the quantity expected to be controlled was estimated at 1,000,000 tons. In March the Pennsylvania and Baltimore and Ohio Companies agreed that the former should have two-thirds and the latter one-third of the business; Youghiogheny coal being excluded. The combination also determined what sections of country should supply; the Pennsylvania railway west of Cape Cod supplying the purchasers to the east must look to Baltimore, where the price was fixed at \$4.50 f. o. b. The price at New York being \$5.35 for Penn and Westmoreland, and \$5.35 for Western Virginia. Consumers were dissatisfied with this arrangement and took from the combination 150,000 tons at New York, and some 100,000 tons in New England, but obtained from England nearly 400,000 tons, from Nova Scotia 118,000 tons, and from the Chesapeake and Delaware Canal Railway, which did not agree to enter the combination but offered their rates on caking coal to  $\frac{1}{2}$  cents per ton per mile, 64,000 tons of Kanawha Valley coals.



A contract for the present year, has been made by the Pennsylvania road, to deliver 275,000 tons at New York, for \$5.50, last year's rate, this leaves 150,000 tons open to competition, and should freights not rise, a portion should fall to the exports of Cape Breton. For the following table of comparative cost, I am indebted to Messrs. Perkins & Job.

Year.	American Coal. Contract Prices.	Nova Scotia Coal. Average Cost.
1872.	\$7.50	\$6.25
1873.	8.25	7.00
1874.	7.50	5.68
1875.	6.50	4.75
1876.	6.00	4.50
1877.	5.50	4.15
1878.	5.50	....

### CUMBERLAND COUNTY.

The demand on the line of the Intercolonial Railway for coal, called for an additional output from the Spring Hill Colliery, and which at times was not able to supply the trade. The total produce of the county has been steadily increasing since 1872, and last year exceeded 100,000 tons. Had it not been for an unfortunate fire which destroyed the engine house and much of the machinery at the above named colliery, stopping operations for several weeks, an additional 10,000 would have been added to the output. The supply from this quarter not being yet equal to the demand which its advantageous position should control, the future prospects are immediately more promising than those of other coal counties, and are likely to lead to the establishment of other collieries and to further competition. A comparison of the coal freights on the Intercolonial published in the last report, and those stated in the present, point where further extension of the trade may be expected.

The opening of the Spring Hill and Parrsboro Railway, in August last, put the mines in communication with a more convenient shipping port than Dorchester now is, especially for the local trade of the Minas Basin. The shipping facilities in connection with the road are not yet complete, and only 2,137 tons were put on board at Parrsboro' in 1877. When the road is fully equipped and proper staiths erected, much coal will doubtless find its way over this road.

### COLLIERIES.

#### CUMBERLAND.

Owing to the disastrous fire in the city of St. John, June 22nd, the further development of this colliery was suspended, and the workings closed. At the time the pit room consisted of both east and west levels, a back balance up 260 feet on the east level 500 feet from the slope, and off the balance 6 bords were broken off 5 yards apart. On the west side the coal was brought down in boxes on runners from the bords which were worked off the level to the rise. The seam yielded only

2 feet 9 inches of coal, and the roof had to be brushed to ground room. A plan of the pit workings has been filed.

#### SEAMAN'S.

The coal mined from this area in the winter season was used at the Lower Cove grindstone quarries.

#### JOGGINGS.

As the east levels of the present lift are now not far from a fault which was pierced in working the upper lifts and found very heavy, it is not intended to open beyond it at present, for a new lift. To the west the workings are approaching the shore, agreed upon, that a sufficient barrier of solid coal may be left between the workings and the shore. A width of 100 yards is now unwrought, and the wisdom of leaving so substantial a barrier is apparent on examination of the colliery plans which shows by the position of an old barn yet standing, that within 30 years the cliff has eroded about 20 feet by the action of the tides and ice of the Fundy.

The first application in this province of electric signalling is in the pit of this colliery, wires having been laid up the shaft to the engine house, at a comparatively small cost.

#### SCOTIA.

The workings on the north portion of the seam mine at Scotia colliery extended east 1000 feet, when in June the pumps were drawn. At the face of the level the stone parting which at Scotia was 10 feet thick, was reduced to 3 feet; still further east on the Chignecto property, the parting is reduced to 15 feet thickness. Since June coal has been won from a tunnel driven on a level with the brook in the direction of the abandoned level 280 feet distant, where the seams give 5 feet and 30 inches of coal.

#### SPRING HILL.

Although the output of this colliery was larger by 21,000 tons than that of the previous year, operations in the principal mine were suspended for several weeks during the winter, owing to the destruction of the engine house and heapstead by fire, and the serious damage done to the machinery, much of which had to be renewed. The boilers were repaired and arranged in sets of two, they are now externally and have two return flues in each. An independent set of two with a distinct brick chimney has been erected at the foot of the slope preparatory to a new lift.

The east level of the Byers' slope has advanced 35 feet, and branches into both sections of the seam, which, since the discovery of the thickening of the parting have been separately worked. The seam varies in thickness, and at one point almost promised to be a new seam, but still going east it has again thickened. The workings in both sections are now conducted so that those in the upper are in advance and the pillars robbed before those in the lower. The coal from the bords on this side is now sent down in shoots to the level.

---

west side of the slope the levels are to the barrier, and the pillars on this side have been brought back, except off the upper level in this district, where a considerable area still remains untouched.

Believing that the two slopes were on the same seam, the upper levels were pushed ahead to make connection; it was then discovered that the east slope workings were in an overlying seam, horizontally distant 60 yards from the other. A most important discovery.

In consequence of the fire the west slope was re-opened, it had been closed on account of heavy stone partings that trouble it, and on working west the available coal was reduced to 4 feet 6 inches in thickness.

Endeavors have been made to follow the 13 feet seam of the series beyond the boundary of the General Mining Association area, but unsuccessfully; the intermediate 6 feet seam has, however, been traced 12 chains to the east.

As something like one-third of the produce of the Black seam has been going hitherto to the waste heap, it is satisfactory to know that a use for a portion of the duff has been found under the colliery boilers. Doubtless in time a local demand will arise for all the small coal produced, especially if previously prepared by washing. Of the slack coal sorted by the rotary screen, the coarsest portion answers for the locomotive, and finds a sale for stove purposes.

---

## PICTOU COUNTY.

This county shared with Cumberland in the enlarged land sales to the extent of 25,739 tons, but as the total increased trade of the county was less than 9,000 tons, there was consequently a further deficiency in the shipments; Quebec taking less by 20,000 tons than in 1876, and from the whole Province less than two-thirds of what Pictou supplied in 1875.

The demand at Londonderry has made coking coal and coke making a prominent feature in the trade of this county, and it may be expected to further assist in directing attention to the preparation and utilization of the fine coal mixed with impurities.

During the year important explorations were made to test the extent of certain seams and the relationship between the Albion and Vale sections. In a great measure the results are still private, the explorations and office work having been chiefly performed in the interest of the Acadia Company. The officers of the Vale and Nova Scotia companies also made surveys and search of value, which have been plotted on their plans. On the Pictou Company's area adjoining that of the Halifax on the south and east, a bore hole has been put down on the apparent course of the Foord pit levels in the Main seam in the hope of proving the extension of that valuable seam. The hole has been bored by Logan's Diamond Drill, and it has reached a depth of 1337 feet. At 630 feet a 3 feet seam was pierced, and the explorers hope to reach the Main seam within 1500 feet. Should they not succeed in reaching the seam, a second hole will be put down further to the rise. The drill employed is not intended for boring below

1000 feet, but by counterbalancing the weight of the rods the named has been reached and further work expected.

## COLLIERIES.

### ACADIA.

The adoption of the Woottan plan of burning the duff from screened slack under one set of the boilers at this colliery was resorted to last year. Further trial of the system thoroughly proved its efficiency, and now all the boilers are fired with what hitherto was waste material, and marketable coal saved to the value of about \$

The boilers are arranged in 4 sets of 3 each; the ash-pit door is made to fit close, and in the side wall there is a hole 15 inches square which can be closed or opened at will by means of two flap shutters opening inwards. A one inch steam pipe is brought down to the bottom of the hole, and 3 pipes 15 inches long and  $\frac{1}{4}$ ths in diameter branch off at right angles from the one-inch pipe and back to the entrance. Each branch pipe has 5 small holes for the emission of steam into the ash-pit. In place of bars, cast (not wrought) iron plates sustain the burning duff. The plates are full of holes of the size on the under to what they are on the upper side. In the third lift is finished and the levels of the fourth are up to the boundary on the north side, showing at the face the very beginning of the fault which in the Nova Scotia slope occurs as an upthrow of 49 feet. On the south side the levels are nearly also to the boundary. The heads through the pillars are now driven narrow, only 4 feet wide, to facilitate the pillar working which is now being proceeded with, taking all but the bottom bench, which is left intact in the fourth lift except where cut by the 4 feet ways for the counterbalance boxes.

A ten ton sample of the Stellar oil coal was mined and sent to Boston.

### ALBION.

A connection has been made between the workings of the Deep seam and those of the Foord pit Main, and the steam pump in the deeps in the former done away with, the large engine of the Foord taking all the water. Advantage will be taken in the winter of this connection to draw a scale of fresh air through the Cage into the workings of the Foord, and in that way partially relieve the winding shaft at a time when a strong current of cold air is apt to freeze up the guides, and so obstruct the passage of the cages. To prevent this evil it may be mentioned that two air furnaces on the head were successfully used, warming the intake.

No coal has been cut in the Cage pit since the spring, but in the section of the Deep seam opened by the stone drifts from the Foord pit, a plane-way rises from which two pairs of levels are being driven to the north, five chains apart. At a distance in of eight chains the headings go up to meet the slants from the Cage pit; the face of the upper level is in some four chains further. The two pair of levels are pushed ahead to drain the seam of both water and gas, of the

---

a great deal is given off, and to carry it away a scale of 20,000 feet of air circulates.

The main levels on both sides of the Foord pit are being pushed on, and the coal at both faces looks well. The south side is still some 3,000 feet from the boundary; on this side the second fault pierced by the levels proved a downthrow of 32 feet, while the faults to the rise in the crop workings, off the old stair pit, proved to be upthrows.

The present levels have a westwardly trend inside the faults. On both sides of the pit the seam is well won out; on the south side five back-balances are open, of which only two are working. The upper north level has two back-balances working and two standing, and the level advanced sufficient for another. The lower north level has two working and one in preparation inside the fault which has been previously referred to as deflecting so seriously the course of the level which is now N 69 E, the seam dipping at an angle of 24°. The level keeps the course mentioned for the distance yet driven, over eight chains, and it would almost seem that the northern dip of the seam has been entered on.

The returns respecting the coke made in 44 ovens show that the yield from 21,888 tons of slack was 10,976 tons of coke. These figures are instructive in connection with the erection of coke ovens at Londonderry and the carriage of small coal to be there made into coke.

#### INTERCOLONIAL.

The south workings from No. 4 slope, though kept open, were not required during the shipping season; the coal mined was taken from the pillars and next the bounding fault on the south and the Acadia barrier on the north of the main slope workings, and also in opening out a new lift.

The slopes for this lift were partly down in 1873, when the disastrous explosion and fire closed the mine. In one of the slopes was found the body of one of the unfortunate victims, still sufficiently preserved in the water to be recognized.

The slopes were down 340 feet and will be extended 120 feet further. On either side counterbalance ways have been driven, leaving 10 yard pillars next the slope, and rooms have been started. In the present working lift the south levels turn westwardly to meet the first upthrow fault which will be pierced at this point to win that section of coal lying between it and the second fault at the foot of No. 4 slope.

The small coal from this mine is sent to Londonderry for coke making, where 42 beehive ovens have been built.

To the deep, and in a line with the main slopes, a trial pit 70 feet deep struck broken ground, which is supposed to be the McCulloch brook fault.

#### NOVA SCOTIA.

The exploring level, No. 8, was driven 3600 feet from the slope northwardly, and ended in ground very much broken up by faults; the quality of the coal also deteriorated as the level approached the great boundary fault of the field. The actual position of this fault is some 200 feet to the west of where it is shown on the Geological

Survey map, and it just permits the crop of the third seam to be at the dam, back of the engine house. It appears to have an underlay to the east, as the bore-hole put down 500 feet at the foot of the up-cast shaft, cut measures which are evidently lower than the others. The tenth level and the other working places on the west side have been abandoned on account of the faulty character of the seam; and the south side only remains open. To prove the coal on the east side of the fault mentioned before, as beginning at the Acadia barrier, cutting off the coal at the face of the slope, an exploring slant was put down 425 feet along the barrier side, the fall coal above the barrier was found to be good and 8 feet 10 inches in thickness. From the bottom of this slant a level has been started to test the seam lying next the barrier.

The large Cameron pump, before referred to has been moved to the foot of the slope, now delivers through 1600 feet of pipe against a head of 766 feet. This is accomplished by a pressure of 100 lbs., the boiler pressure being 60 lbs., and by the pump exhausting into the suction, when it makes 15 strokes per minute, again when exhausting into the return.

#### VALE.

The successful use of duff under the colliery boilers at the Vale has led to a trial of the screenings from the slack of this mine under ordinary grate bars, and a subsequent entire adoption of that material for similar purposes. The combustion is quite as thorough with a coarser quality, and as the screenings are at present unmarketable, the economy of their use is not inconsiderable.

In the pit, shoots have replaced counter-balances for lowering the coal from the rooms to the levels; in the centre of the headgear iron plates 2 feet wide and three sixteenths of an inch thick, are put down; the shoots are kept full, and the coal being very hard receives but little damage. On the east level, now in some 600 feet a nip reduced the seam for a space to 5 feet in thickness. On the other side and beyond the fault, it is 7 feet 6 inches, and although very hard, somewhat more tender than elsewhere. Further explorations indicate that the Lawson fault, which the west seam should soon reach, will prove no serious obstacle; and that the west seam is really identical with the so-called widow McLean seam, and confines of the area.

#### CAPE BRETON COUNTY.

The collieries of Cape Breton supplied less coal than even the previous year to the several markets enumerated in the report, except to the United States, where an additional 49,000 tons were sent for gas making under the circumstances already mentioned. Owing to this exceptional demand, the total sales were 33,000 tons in excess of 1876, and only 3,000 tons behind the year preceding.

The completion of the Sydney and Louisburg Railway has been noted, but the shipping arrangements are not yet complete.

Louisburg, where it is contemplated to put up staiths of such modern designs as are compatible with economy.

## COLLIERIES.

### COLLINS.

The slope has been extended to a length of 1100 feet and is to be continued 400 feet further. The present north levels run but a short distance before they reach the barrier which will be left to guard against percolation of water from the Little Bras d'Or. The ventilation of the pit is at present controlled by the waste heat from the steam pump; to meet the requirements of more extended workings, a furnace at the foot of a vertical shaft will be built.

A tug has been added to the establishment to tow laden vessels round Boularderie, through the Big Bras d'Or to sea; light vessels entering by the shallower passage of the Little Bras d'Or.

### SYDNEY.

Since the strike in 1876, no coal has been drawn from the Queen pit, the output of the past year having been altogether from the new winning, and by the single tub cages, temporarily placed in the pumping shaft. By means of them 15,300 tons were raised in one month; exceptionally good work. The bords from the Lloyd Cove pits have been driven out under the waters of the harbor, and dips have been started directly under Cranberry Head to win the portion of the great submarine field that lies contiguous to the Head. The plan proposed of winning the coal has been carefully devised, with the view of making these pits available for the extraction of all that their position commands. The pillars left in the first working of this section, are of increased size, being 14 by 33 yards. The workings are dry, and the ventilation is effected through the connection with the Queen pit section to the furnaces.

The sinking at Lloyd's Cove has at last been completed, the hoisting shaft having reached the seam in the autumn, and the work of fitting-up begun. The magnitude of this undertaking has exceeded the anticipations at the commencement in 1866. Mention has been made, in previous reports, of the heavy feeder of water that was met with and which necessitated the shafts being tubbed, and the consequent delays and vast expense. The outlay, it is hoped, will, before long, be warranted by the renewed demands of trade.

Mr. Elliott, the engineer, has devised and applied a float with steam whistle attached, to call attention to both high and low water in the boilers. The float works a ratchet wheel, moving a D valve, and as it requires no stuffing box, it is free from a liability to stick and get out of order.

He has also adapted at the new winning, a modified cradle to hold the pit tubs and empty them on the screens, in such a way that the coal is saved from falling, the breakage consequently reduced, and the use of the ordinary, simple and cheap box tubs continued. The frame of an ordinary cradle, hung on trunnions, is extended a few inches above the tub, and the top is covered by a door, hinged a third of the





---

Both these fires point a lesson, and indicate that there is wisdom in having, when possible, colliery buildings detached.

#### GLACE BAY.

The new Stirling pits having been completed, levels and headways were opened from them in the Harbor seam and furnished the chief source of supply. When sinking, a feeder of water was cut which occasioned much detention. It was met with about half-shaft, and as it was not tubbed back, nor yet shows any signs of diminishing, it entails considerable expense for pumping.

To reduce the handling and save the coal from as much breakage as possible, the pit tubs are run on a direct double track from the shaft to the shipping wharf.

#### CALEDONIA.

More than usual was done at this colliery in maintaining the surface plant in working order, and a change was introduced in the style of pit tub used with a view to lessening the breakage of the coal. The tubs adopted have the following dimensions:—Extreme length 7 ft. 10½ in.; inside length 7 ft. 7½ in., inside width 2 ft. 9 in.; inside height, 2 ft.; extreme width, 3 ft. and extreme height 3 ft.; wheel base 2 feet. Tubs of these dimensions replace such as were described on page 52 of the Report for 1872. The advantages connected with the new tubs are lessened height and increased capacity; the disadvantages, that the tracks require to be strengthened and have easier curves.

#### ONTARIO.

Coal has been taken only from the new lift which gives a winning of 270 feet. To assist in the additional work which a new lift entails, a horizontal boiler has been set.

#### BLOCKHOUSE.

The coal shipped was mined chiefly from the pillars, which, originally left of good size, yield large coal when removed. The shipping wharf was strengthened by a continuous crib on the east side and now presents a solid face of square timber to the sea.

#### GOWRIE.

As of late years, a considerable portion of the produce has been from pillars off the lowest level on the east side and immediately east of the main incline off the upper level. The chief workings have been between two and four hundred yards to the west of the incline; fourteen double rooms being worked, and the pillars between them being soon after brought back as previously described. A new self-acting incline, 400 yards in from the present, is fitted up ready for working.

#### GARDENER.

Coal mining was resumed late in the autumn by Mr. W. Routledge under an agreement with the Merchants' Bank of Canada.



area available is undoubtedly large, and for working conveniently disposed, but to successfully compete for the existing trade a colliery here requires shipping facilities, and a secure harbor for vessels. To meet these wants, it is proposed to open McIsaac's pond and protect the entrance by piers, as at Glace Bay, or to run a railway to Whycocomagh and the Strait of Canso.

---

## GOLD MINING.

---

The produce of the year, 16,882 ounces, has not been equalled since 1870. In the early part of the year the returns from the principal districts were exceptionally good. They stimulated mining and led to extensive prospecting. Not only did Sherbrooke continue to be the leading district, but it produced during the first six months as much as during the whole of the preceding year, and at the rate of its most prosperous season, 1867. Of the other prosperous districts, Caribou exceeded its best yield, that of 1869, by 160 per cent., and Oldham produced 30 per cent. more than in 1870, its best year. The leads from which the exceptional returns were obtained will be found noticed in the following short reviews of each district's operations.

The advantages in gold mining attending the use of high explosives have been already noticed, and also the preference that is given to dynamite after trial of such other compounds as mica powder, rendrock and lithofracteur. The two last mentioned, selling at only two-thirds of the price of dynamite, are still used, as well as black powder, on account of the high price of dynamite. Gold miners will be glad to hear that the British Dynamite Company contemplate establishing a factory near Montreal for the purpose of controlling the trade of high explosives in the Dominion. If this is done the price will probably be reduced to 55 cents per pound.

A trial was made by Mr. McClure, at Waverley, of one of the Victor Hand Power Borers in his mine, which in some respects was satisfactory, but as the drill requires, as at present constructed, at least a width in the stope of three feet, it is suitable only for few leads. It is to be hoped that further trial in suitable localities will be made with this machine-tool which elsewhere has proved decidedly successful.

## DISTRICTS.

### CARIBOU.

The rich lead discovered on area 629, block II, in the autumn of 1876, held out till July, and by that time had produced 1170 ounces. All the gold was taken from a stope of 40 feet and within a depth of 120 feet. The shoot of rich quartz was vertical and at the line of

junction of a cross-lead. On the adjoining area, 630, a shaft was to a depth of 115 feet without finding paying quartz, and abandoned. Much prospecting was done in the neighbourhood, 1500 feet of trenches cut, but no lead of any promise found.

On area 227 the Hyde lead was worked down to a depth of 60 feet in the pumping shaft and stopes worked on both sides. Operations were suddenly brought to a close by the destruction of the mill and hoisting gear by fire. Undaunted by their loss, Messrs. Caffrey are now rebuilding and hope to resume mining early in spring. In the direct line west of the Hyde lead, and beyond where the strata flatten to  $45^\circ$ , an angling lead was opened by Mr. Toulson, being 6 inches in thickness and at first yielding from 2 and 3 ounces. It promised well, but did not prove in the end profitable, and was abandoned. He also cut some 4,000 feet of trenches about McLeod Lake and only exposed one poor 4 inch lead.

On the Jennings lead area, 474, and next the free claim, a 40 foot stope was taken down to 90 feet or more. The lead is 6 inches thick and dips north at about  $60^\circ$ . At one time it yielded well, but was abandoned at the end of the year. During the latter part of the year the returns of the work done on area 20 showed the best results.

#### MOOSE RIVER.

Workings in this district at one time looked very promising. The yield from a little flat lying lead, dipping north, and owned by Mr. Hiltz, was very encouraging; but the difficulty of access has interfered with the prospecting and successful working of some of the discoveries. The principal mining was on area 25, where a lead dipping south, from 4 to 12 inches thick, was opened to a depth of 100 feet. Some heavy trenching was done, and in one spot where 22 feet of soil was removed.

#### FIFTEEN MILE STREAM.

Prospecting has been continued by Messrs. Hall and a few others. The surface workings promising well for the labor expended; but the difficulties of access to the district greatly interfere with that economy of working essential to the success of most mining enterprises.

#### GAY'S RIVER.

Shallow pits were put down to the bed rock on two or three areas, but no paying "runs" appear to have been found except by Mr. Dunlap on area 3, near the mill dam. He sank a slope and got to the bed rock under 33 feet of cover. The conglomerate carries little gold, but in certain backs the gold seems to have worked down to depths of 3 and 4 feet, and that much of the rock is removed. The runs or depressions in the slate course north-east and south-west, while the backs are about north and south. At the slope mouth Mr. Dunlap put up a five stamp mill, the engine of which also does the pumping.

#### LAWRENCE TOWN.

A few ounces of gold were taken from the cross lead, area 10, and two small lots of quartz from Chezzetcook were crushed.

Crook's mill. In the early part of the summer tributers on Mr. J. H. Townshend's property did remarkably well by mining the "throw" of a large lead in area 280 or thereabouts. Mr. Townsend resumed control of his property and late in the year prepared to work the lead extensively should further trial warrant his doing so. He also had his mill refitted.

#### MONTAGU.

Hardly any mining was done in this district, though there was much prospecting east of Bendigo, in search of the lead from which the numerous large and rich boulders found widely scattered on the surface must have come.

No work was done on the Cross lead in depth, but a little on the surface, and in the adjoining Sarah lead. Preparations are now being made to try the Cross lead in depth; and another party of tributers have taken Messrs. Lawson's mine on the Belt lead, and are re-opening it. Some work has also been done on the St. Patrick's lead, but the result of all operations shows only a small yield.

#### OLDHAM.

Operations in the Bonanza (Donaldson's) mine, area 130-1, were suspended in the summer, and only with great reluctance as much money had been expended in putting the mine in order. When the mine was closed, the pumping shaft had reached a depth of 255 feet, and from the bottom stopes rose to the east towards the break. A third pit 120 feet to the west was begun, and close by the dump a small angling lead was opened, which at the surface gave one lot of 26 ounces to the ton, but nothing to pay in depth. It courses N. E. and S. W.

During the spring the Blackie lead was further worked on a length of 300 feet, and in the middle stoped to a depth of 60 feet. The gold was found only in spots and ultimately the workings were abandoned.

Tributers worked in several parts of the district, in the neighborhood of the rich discovery, area 627, on the Hall lead and in the angling leads of the McKenzie and Sterling properties, but without marked success. Late in the year a shaft was put down on the Blue lead near the swamp, to test the intersection of that lead with the Britannia, and at a depth of 74 feet, a tunnel started south to intersect the metals. The Hay or nugget lead was worked to a depth of 80 feet; in width it averages 8 inches, in composition it contains much calcspar, and the average yield is about 6 dwts. It would almost seem that the gold contained had been chiefly concentrated in the one 60 ounce pocket, for no others have since been found.

The produce of the district was largely in excess of any previous year, owing to the discovery, at the eastern end of the district, near Rockhead, on areas 627-8, of a rich lead by Mr. T. N. Baker. Where opened, the lead curves smartly round with the strata, altering its course as much as 50° in a distance of 60 feet; and being on the curve of the anticlinal, its general course is N. and S. The deepest shaft is now down 120 feet, and the stopes extend about 80 feet. The lead is affected by numerous rolls of small size, from 6 inches downwards. The produce of the first five months working was 1280 ounces.

## RENFREW.

As of late years, operations in this district have been small. In the winter a little work was done on the Clements lead. Later on the Ophir lead was opened on area 200, to the west of the rich group, and pumping effected by rods led from the St. Andrew's mill, but the returns were not very satisfactory. Mr. McClure re-opened the McLeod lead on area 369, where nuggetty gold had been obtained years ago, and he erected a ten feet water-wheel to supply power for pumping and hoisting. The lead has averaged about an ounce to the ton. Other work was done on area 318 and 319 on a lead overlying the Preeper.

## SHERBROOKE.

The mill returns for the past year show a larger yield than that of any since 1867, when some 9,464 ounces were obtained. In 1877 the amount of gold returned was 8,237 ounces, an excess of 1,103 ounces over the yield of the next best year, 1870, and 3,060 ounces over that of the preceding year.

The Wellington Company continued to regularly work both the Dewar and Wellington leads and opened a promising lead that lies midway between them. The sinking on the former has reached a depth of 420 feet, and the stopes extend west 150 feet and east to the Rockville line. The west stopes are worked by four levels from an inclined shaft, and both over and underhand stoping is practiced. The width of lead and rock excavated is 2 feet 9 inches. As the lead lies at the low angle of  $45\frac{1}{2}^{\circ}$ , there is a strong tendency for the hanging wall to settle, and therefore to protect the shafts from blockings of hardwood 5 feet by 3 feet are occasionally put in. Care is taken to stow the scaffolds tight.

In the underlying Wellington the stoping still goes down to the west and extends from the shaft 300 feet. The upper stopes have been abandoned as unprofitable. The new intervening Middle lead on area 651 and 653 Block III. is from 8 to 10 inches thick and yields over an ounce to the ton; the width excavated is 3 feet 8 inches.

Mining on the supposed Murray lead on the Alexander property stopped in January; the party of tributers then took the Try Agony but as the Dewar lead is there only half an inch, though yielding 1 oz., mining was unprofitable, and they ultimately opened two leads only 18 inches apart, on area 556.

On the Grape-vine property, the south lead was worked down 140 feet with stopes extending 150 feet. On the surface it was 12 inches wide, at the bottom it is now reduced to 8 inches, and a streak has been passed through in the west of the workings. So far mining was also carried on in the middle lead, the extension of which is worked on the adjoining areas 616-7 in the Gladstone pit. This is down 90 feet, and requires more timber than usual, as the walls are shaken. The lead is about 4 inches thick. A shaft by the same owners was sunk on area 613 to strike the extension of the south lead, and it yielded to them over 2 ounces.

Late in the year a lead was cut on area 631, Block IV., which dipped north, and was 6 inches thick; it promised well, but when the streak reached area 661, Block III, it no longer paid.

On the Dominion property, area 778, Mr. Fraser working down the lead mentioned as opened in the previous year, struck a rich streak that in April yielded 414 ounces from 114 tons, and realized a profit of about \$7000. The east shaft pierced the streak at 90 feet, and the next shaft east, on the adjoining area, gave but a moderate return. Three leads close together were worked, the middle being about 8 inches thick. Adjoining leads were also opened and tried, as the McQuarrie 10 feet to the north on area 778; and another to the south on area 780, showed a number of leads within a width of 12 feet.

The success met with an area 778, induced an attack on the Dominion belt, areas 745-6. A shaft was put down just east of the great Palmerston mine, to take the streak at a depth of 120 feet. The streak dips east at a high angle, and when the old mine was abandoned it was reported to be still rich; it had not been followed below 85 feet on account of water. However after great expense the shaft was got down, but the lead though thick, did not realize the expectations of the adventurers.

At the end of the year preparations were made to open some of leads on the Chicago property.

The Aquadale crusher on the brook running into the north-west Arm, was sold to a Sherbrooke company and renamed the Goldenville. A new crusher was also built on the same brook just above the road.

At Cochran's Hill some work was done on a lead on areas 535 and 585, block LXXVII. during the last half of the year, and the quartz mined 118 tons, yielded when crushed at Melrose about 48 ounces.

#### STORMONT.

The only mining in this district has been on the same lead reported last year, on area 4, Block II. Besides sinking the shafts an adit was started from the shore on the lead to reach the workings distant about 300 feet. The quartz obtained was shipped to Sherbrooke for treatment, no mill in the district being readily available.

#### TANGIER.

At Mooseland, mining on the Cumminger lead was stopped in April, and but little prospecting has since been done there. At Tangier Mr. Barton opened one of the leads he exposed by his surface drifts immediately to the north of the alluvial workings of 1867, and he found that in its westward course it curved from the swamp to the southward; just beyond the bend it has been yielding about 3 ozs. to the ton, along a stope of 90 feet; and it averages about 4 inches in thickness. No other mining was done until late in the year, when tributers prospected on the Burlington property and near the river.

From Ecum Secum a lot of four tons was crushed at Tangier which gave over 6 ounces.

#### UNIACKE.

After refitting the mill, equipping the mine, and doing much dead work at great expense, without being able to make the mine on area 614 pay working expenses, Mr. McClure reluctantly abandoned sinking when the lead had further pinched to 4 inches and declined in value. The main pumping shaft stood at a depth of 260 feet, No.

2 at 235 feet, and No. 3 at 216 feet. The streak also narrow 80 to 50 feet in length. At a depth of 130 feet in No. 2 still carried on towards No 1 on area 647.

Trial workings were conducted by tributers on several plots and some small lots paid well, but the most promising discovery made on the Toronto property, area 755 (?) of a three inch lead at first yielded 4 ounces to the ton.

#### WAVERLEY.

This, at one time important, district, did not share in the prosperity, but produced less than in any previous year except 1876. The working in the Union lead on area 169 was steadily carried on but it was found that the fault still caps the lead to the east. The tunnel east has advanced over 100 feet from the east shaft without opening profitable ground.

On the adjoining and underlying Dominion lead work was at the same time continued, on area 190, and at a depth of 61 feet in the tunnel was driven some 70 feet or more to the east before operations were discontinued.

On American hill the shaft sunk to cut the Graham lead down 64 feet, and from the bottom a tunnel was driven towards the Graham, but the latter, instead of dipping as it was expected to be a parallel vein and distant 31 feet, and further to the east. Much prospecting was done in this section of the district, but without success.

On Laidlaw's Hill a party of tributers found some rich blocks on area 128, which paid them well. On other areas prospectors have not yet met with like reward.

#### WINE HARBOR.

On the Orient, at the Barrasois, mining was carried on during the greater part of the year; the pumping shaft is down 110 feet, and the stoping which stopes extend 60 feet under the swamp; to the west of the 100 feet deep cut rolls 10 inches thick dipping west, which yield 10 dwt. The lead is vertical.

On the Barrens the Moore lead was worked until the autumn, when the east shaft reached a depth of 144 feet, stoping extending to the west.

In the autumn the principal work was on the Mitchell lead, and a connection made with the main tunnel by a branch 100 feet long, by which good drainage was effected. The produce of the district was only half of what it was in 1876, though equal to the average of the two preceding years.



---

## IRON MINING.

---

So long ago as 1835, Dr. Gesner, when writing on the Geology of Nova Scotia, deplored that the country was fated to import iron while the hills were well known to contain rich ores, easily accessible, and in great quantity. The conditions of trade have not much changed since then, though Government opposition to manufactures in the Colonies has long ceased. Even now after a lapse of more than 40 years, the proportion of home made iron to the quantity imported into Canada is very small. Just as with the coal trade, its history goes back ninety years, and that industry has not yet assumed command of the home market. The struggle to place iron among the manufactures of the Province may be said to have begun fifty years ago, when a Provincial association employed Mr. Cyrus Alger to erect (1826) the Annapolis Iron Works at Moose River. The history of iron working in Nova Scotia began even earlier, and in the first decade of the century a small Catalan forge produced some bar iron from the ores of Nictaux. It is even said that the French had forestalled this undertaking. The first operations at Moose River were hardly established before they were suddenly suspended owing to political causes, but not before "excellent iron had been produced, both pig iron for foundry purposes and refined bar iron." For 33 years the works were closed, and when operations were resumed it was for a short time only, to again be neglected for ten more years. The last attempt to establish these works was spoken of in the Reports of this Department for 1872-3.

The next attempt to utilize the iron ores of the Province was made by the General Mining Association at the Albion Mines, but it did not advance beyond importing some machinery and trying to reduce the East River ore at the foundry. In the attempt the foundrymen became impatient and assisted the furnace to Scotch pigs sufficient to fill the prepared moulds and maintain their reputation as smelters.

Then followed the establishment of iron works at Londonderry in 1850, and about the same time others at Nictaux Falls. The development of those of the former has been noticed in Dawson's *Acadian Geology*, How's *Mineralogy*, 1868; by Mr. Selwyn in the *Canadian Geological Report of Progress* 1873, and the later extensions in my late Reports. The latest improvements and present condition will be presently referred to under the heading *Steel Company of Canada*. The operations of the latter at Nictaux and their ultimate abandonment are referred to by the two first mentioned authorities. This locality has again come into notice in connection with the building of the Nictaux and Atlantic Railway, and the explorations made in the neighbourhood by Messrs. Stearns and Page.

When the furnace at Moose River was in blast in 1827, ores from Nictaux were mixed with those of the neighborhood. Of the quantity used then, and subsequently when a furnace was erected at the Falls,

the statistics are most incomplete; still it would appear that thousands of tons were mined, chiefly from one bed of shell ore at Wheelock's orchard. Knowledge of the ores of the district is confined to one bed; in 1855 Dr. Jackson, State Assayer of Massachusetts wrote:—"One cannot fail to be surprised at the quantities of ore which are already exposed by the numerous workings which have been made. There are several distinct and pure varieties of iron ores which we examined, from four to ten feet thick, extending certainly no less than five miles, continuously supplying iron ores at Nictaux is inexhaustible." Dr. Hayes, a short time before the ores of Nictaux, and spoke of the bog ore on the west side of the river, of the less compact bright bog ore of the Little River, and the bog ore of the valley. While the bog ores are very dissimilar in appearance, there can be little doubt that they and all the intermediate varieties, from the compact bog ore to the friable fossiliferous red ore, are of the same age; the gradation from one variety to another being gradual and dependent on the distance from the seat of metamorphic action.

Mr. Mushet writing to Mr. C. Archibald said:—"The bog ore is quite a novelty, and the magnetic character of some of the bog ores contrasts strongly with the inert state of others to all appearances of similar composition. I have examined it, and find that it is comprised of magnetic, and non-magnetic laminæ. The bog ore former gives 67½ per cent. of iron, and the latter 54 per cent."

Messrs. Stearns and Page on their arrival in the district devoted their attention to the magnetic ores of the Cleveland basin, and as far as Lawrencetown, a distance of 6 miles to the river, where the strata are finally cut off by the granite. In the neighbourhood of the river they exposed many beds of ore of width up to 12 feet. The general course of the metalliferous strata is N. 55° E. Six miles east of the river the transition of the bog ore into hæmatites takes place. On Foster's farm, (late N. P. farm) fossiliferous ore of the character described by Mr. Mushet is exposed, and within 100 yards of it in the same course east, red bog ore makes its first appearance. West from this point on the Cleveland bog fossils are abundant in the magnetite, but they become less distinct, until beyond the river all trace of them has disappeared in the magnetites. The hæmatite beds have been exposed on the farms of David, John and Ingraham Banks, 4 miles east of Canada Williams River; and they have also been reported at Annapolis 4 miles further east. One bed is highly fossiliferous, the other is compact and readily cleaved. Meadowvale, where this ore was first discovered, is only some two miles from the Annapolis Railway.

Bog ore of superior quality is found in the valley at several places between the farm of E. Payson at Meadowvale, at J. White's at Middleton, and on to J. Beales' at Inglesville, a distance of 10 miles. The ore is of the character called "Pitchy Hydro-magnetite" and affords 47 per cent. of iron.

Analyses of some of the magnetites and red hæmatites of the district were published in the report for 1875 on page 61.

## STEEL COMPANY OF CANADA.

The works of this Company, at Londonderry, now present a more complete appearance, and the operations of making and working iron have been extensively conducted. One of the two new furnaces was lit and kept in blast 44 weeks, the foundry was busy using about 100 tons of metal per month, puddling was once more resumed, and a rolling mill erected and ran.

To the courtesy of Mr. Jamme, the manager, and Mr. Louis, the analyst, I am indebted for the following data:—

1877.	MINED.	SMELTED.	METAL PRODUCED.
Iron ores,	16,879 tons.	20,270 tons.	} 9,863 tons.
Ankerite,	1,724 "	1,850 "	
Limestone,	5,164 "	6,520 "	
Coke,		15,970 "	

The best weekly yield was 297 tons.

The furnace in use is 65 feet high and 19 feet in diameter at the boshes. The blast has a pressure of 2-4 lbs. heated in three Cowper Siemens' stoves 800°-1100° Fahr.

The blowing engine has the steam cylinder above the blowing cylinder, which has a stroke of 5 feet and a diameter of 6 feet.

Water is brought in a flume 3460 feet to the blast furnace, and 4060 feet to the rolling mill.

There have been built 6 single puddling furnaces and one double, 2 more double furnaces are in process of construction; and there is 1 heating furnace; in all having a capacity of 20 tons of finished iron per day.

There are two trains of rolls, one 9 inch and one 16 inch trains; two steam hammers, one 20 cwt. and one 50 cwt.

The bar iron made, according to Riehle Bros. tests, is "ductile and fine grained;" Tensile strength 60,000 lbs. per square inch, and elongation 33 per cent. The "Best Best" iron has been used to replace Lowmoor and Swedish iron. The following analyses by Mr. Louis shew the high character of the pig and bar iron:—

	No. 1 PIG IRON.	SIEMENS' BEST BAR IRON.
Silicon,	3,621....(part slag).....	.280
Graphitic Carbon,	3,730.....	
Combined Carbon,	.390.....	.096
Sulphur,	.002.....	trace
Phosphorus,	.198.....	.035
Manganese,	1,126.....	.041
Iron,	90,988.....	99,548
	100,000	100,000

There have been erected at the works 42 bee-hive coke ovens having each a capacity of 6 tons of coal. Since October, when coke making was begun, 3,440 tons have been produced from 6,650 tons of coal. Mr. Louis has analysed the coke and he gives the following as its composition:—

## MINES REPORT.

### COKE FROM ALBION COAL.

Moisture.....	
Fixed organic residue.....	
Volatile organic matter.....	
ash.....	

Sulphur.....

The principal mining of late has been at Martin's Brook. The source of ore was the stopes above the shallow level, under the sheet of cover. The stopes from No. 5, under the sheet of cover, furnished ore. These levels are in about 2000 feet above the Merland Brook levels were driven, and some work also done.

From the furnaces to the mines there is a narrow gauge track, and the ore trucks are moved by a locomotive. Captain F. J. Per, states that the average number of miners employed is 40, mechanics 10, and boys 5. About the furnaces about 100 more men were employed.

St. Louis has supplied the two following interesting analyses of Psilomelane, an encrusting mineral occasionally found in aggregations, from whence comes the manganese nodules of Londonderry; the second of cinder from the blast furnace.

PSILOMELANE.		BLAST FURNACE CINDER.	
.....	67.10	Silica.....	
.....	10.67	Alumina.....	
.....	.88	Ferrous oxide.....	
.....	4.00	Manganese oxide.....	
and trace of Si O <sub>2</sub> .....	.67	Lime.....	
and Co O.....	.65	Magnesia.....	
.....	2.49	Potash.....	
.....	trace	Soda.....	
soluble matter.....	} 4.08	Calcic sulphide.....	
and little Al <sub>2</sub> O <sub>3</sub> .....			
	100.36		

## MANGENESE MINING.

The quantity mined in Hants County in 1876, was, according to local inquiries, to have been 56 tons, instead of 16 tons. An amount 47 tons went from Teny Cape, and the remainder from Rainy Cove. At Teny Cape, the ore is found in depths in flat lying deposits, and also in small veins.

---

The produce of the last year was 97 tons, which was sent to New York, where for the best quality \$55 per ton was obtained. The Custom House entries show that 78 tons were shipped from Windsor and its outports, valued at \$2,450. The average number of hands employed at Teny Cape was 8 men and 4 boys.

Manganese has been found at many spots westward of Teny Cape, and openings have been made on the west side of Walton River, at Rainy Cove and near Cheverie. The explorations of the past year were chiefly near Rainy Cove, under the direction of Mr. R. Kennedy. At the locality selected the surface yielded a good deal of ore, which was washed and hand-picked. Two small contiguous veins of 3 and 4 inches wide, were also exposed, and they promised fairly, but for want of means operations were suspended.

The right to work manganese is not reserved, but belongs to the owner of the soil, who in some cases agrees to lease at one dollar per ton, and grant to the miner the right to make roads, build houses and use what timber he requires for his operations.

---

## LEAD MINING.

---

At the spot at Caledonia described in the last Report, the work of exploration has been continued; the tunnel into the hill was extended 160 feet, and 10 feet driven on the cross vein without any improvement. The ground above was stoped for 20 feet and below two 6 feet stopes were taken in; then a shaft was sunk 25 feet deep at the river's bank and a tunnel started under the river in hopes of finding an improvement at the intersection of the vein with the change of formation, which is presumed to be near at hand. The shipment on which royalty was paid was 12,700 pounds in 1876. There has since been sent to England about 19,000 lbs. The lead contains sufficient silver to pay for its separation and allow a small return to the miner. The lot mentioned returned \$6 for silver. So far the quantity of ore obtained, though excellent in quality, has been small in proportion to the expenditure, and unless larger aggregations of the deposit are soon found work will be discontinued.

At Pembroke the existence of galena disseminated in limestone, has been long known, and some seven years ago explorations were there made, but were shortly abandoned, more on account of the character of the ground than from any discouraging appearance of the deposit.

Prospectors during the past year, drove a tunnel in about 70 feet southwestwardly, near the shaft of the first explorers, without discovering a definite vein, but in spots they found the limestone sprinkled with galena. The tunnel terminated in a pot-hole filled with clay. They then started a shaft a little to the south on rising



high. Shallow drifts and shafts were driven and sunk to prove the deposit, but of the results I have no information. Nor that further work was done until 1876-77, when six months work of twelve men produced according to the statement of Mr. Prendergast, the manager, some 36 casks of ore, each averaging about 900 lbs. Subsequent work for two months yielded 6 more casks averaging 800 lbs. each, or a total of 18½ tons, valued at New York at \$120 per ton.

The excavations made extended along the bank about 400 feet, and inlaid over 200 feet, in length they measured nearly 2000 feet.

Across the river some work was also done, but as in 1866 it did not prove so remunerative, only one bed and that small, containing nodules.

On the west side the grey sandstone beds near the top of the bank, carry the nodules disseminated through them to a depth of about four feet, the principal deposit being in a dark grey bed from 8 to 10 inches thick. Owing to the action of subaerial agents, the bed has a greenish caste, and the nodules are coated with carbonate. In composition both the mono and bisulphide occur; Mr. Louis the analyst at Londonderry, was the first to detect the presence of covelline. The nodules are on an average small, not larger than cherries, though some have been found weighing one and a half pounds. When I visited this locality the drifts had so fallen in that it was impossible to estimate the apparent extent of the deposit, but from what was to be seen it appeared not improbable that the nodules were not equally disseminated throughout the bed in which they are found, but are collected together, as it were, at eddies or banks in the sandstone deposit. Below the grey beds come beds of a reddish color, and below them, close to the river's edge, other grey beds in which are the remains of plants, the tissue of which has become filled with copper pyrites.

At Waugh's River and at other places in the neighbourhood copper ore thus associated has been found. It has been worked on Waugh's River about three-quarters of a mile from New Annan, and in 1877 some eight barrels of ore were collected weighing about 3 tons and valued at \$30 per ton.

## NON-METALLIC MINERALS.

## GYPSUM.

The exports of the past year were larger than those of 1876, but the declared value was reduced. The shipments were as follows:—

	Tons.	Value.	Destination.
Antigonish.....	703	\$ 803	Canadian
Baddeck, C. B..	450	..	United States
" " ..	2,790	..	Quebec.
Mabou, " ..	200	..	"
Cheverie.....	26,205	\$ 92,797	United States
Maitland.....	2,610		
Walton.....	2,284		
Windsor.....	72,009		
Wallace.....	255	\$ 255	P. E. Islands

The local consumption of plaster is not known, but is small, as the trade is altogether supplied from Dorchester.

## BARYTES.

At Five Islands some 23 tons of barytes were mined at a spot by the Dolphin manufacturing company.

## FREESTONE.

Shipments and manufactures of A. Seaman & Co., Lunenburg, Cumberland County, during 1877.

Goods.	Destination.	Quantity.
Grindstones.....	United States,	1113 tons
" Frames....	" "	400
Grindstones.....	Canada,	75
the whet-stones....	"	750 boxes
Grindstones in stock.....		550 tons
" Frames in stock		1500

Grindstones shipped:—

Grindstones.....	3 tons
Building stone.....	300 tons

Antigonish shipped:

Grindstones.....	382 tons
------------------	----------

At Mabou,—Hogg & McKean's Quarry produced:—

Building stone.....	1500 tons
---------------------	-----------



**Wallace shipped :—**

Building stone, to Boston..	1028 tons	\$ 3,598
“ “ St. John's	522 “	1,827
“ “ St. John	125 “	438
“ “ Halifax..	442 “	1547
Rubble stone....St. Peter's C. B.	325 “	400
“ “ ....Charlottetown	1535 “	1,535
Building stone..	70 “	225
Rough stone....	1903 “	951

**LIMESTONE.**

Pugwash shipped.....	1342 tons, valued at	\$1,610
Antigonish “ .....	220 “ “	558

The quantity of limestone quarried for use as a flux at the Londonderry iron furnace, has already been mentioned. The quantities burnt at Shubenacadie and in other parts of the country for lime, are not accurately known; but it is believed that Messrs. McLaughlin & Co., burnt about 3000 tons near Shubenacadie, and other parties in the same neighborhood, about 1000 tons, making in all about 16000 barrels of lime.

**PETROLEUM.**

Boring for oil at Lake Ainslie having been renewed, that locality was visited, and convincing indications of the existence of petroleum seen. Among those observed and reported to exist are the following: Oil on the surface of the water at certain spots: it is even said to have been noticed in holes cut through the ice for fishing purposes: at any time drops may be collected from fissures in certain of the sandstone beds, and while the sides of the fissures are heavily charged with petroleum, some of the beds exposed on the beach contain sufficient to emit a thick flame when pieces of the stone are thrown on a fire. Last summer oil was noticed when digging for water near Loch Bain.

Surface indications have been traced over a wide area, embracing all the district of Lake Ainslie 12 miles in length, through Skye Glen, on Hay River, and they have been reported from other localities in Inverness.

Operations were commenced in the summer of 1869 near the house of J. McIsaac, though a lease on the adjoining property of McDonald, (Tulloch), was granted the previous autumn. The work of boring was proceeded with irregularly, at first by means of a spring-pole, and afterwards with the assistance of a donkey-engine. At a depth of 562 feet oil was “struck,” and some was forced out with salt water under a strong pressure of gas, pumping was resorted to, and the escaping gas conducted and burnt under the boiler. The yield of oil being small, The Lake Ainslie Pioneer Oil and Salt Company, determined to bore deeper, and put the hole down at a subsequent time to a depth of 802 feet without further discovery. In the meantime a large engine and better tools were provided, and a new well started three-quarters of a mile away, near the southern end of McIsaac's property, and within 20 feet of the shore. At about 330 feet down.

nd salt water were met with, and the attempts there-  
p the hole failing, nothing was done until 1876, when  
tubed, and the boring continued to a depth of 1600  
out success.

A few rods to the south, on McDonald's farm, on the  
er and Payne, a well was begun in May 1877, and at a  
60 to 100 feet oil was obtained, in all about a barrel  
hole will likely be shortly renewed. A fourth hole was  
autumn by a Pictou company, on a spot a little further  
h, and oil is reported to collect on the surface of the wa-  
hole is standing. Further work by those interested in the  
nfridently expected during the current year. The o-  
s are of lower carboniferous age, and it would appear  
been pierced in the deepest bore-holes, the grey s-  
ing place to red.

## ACCIDENTS.

If those reported, six were attended with fatal re-  
osions of gas six persons were burned; by powder three  
injured, and by an explosion of a steam boiler three  
d. By other means 14 more persons were known to be  
r killed or severely wounded during the past year. Sev-  
eight lives lost by the six fatalities were lost in or about  
ighth at a gold mine.

### FATAL ACCIDENTS.

- . April 26th—Murdoch McDonald, aged 24, single;  
McNamara, aged 20, single; John Nearing, aged 56.  
Cause—an explosion of a boiler at Lingan.
- . May 16th—John Bonar, leaving a wife and 5  
Cause—a fall of stone in a shaft at Sydney Mines.
- . June 20th—John Burchell, aged 22, single. Cause—  
down a shaft at Sydney Mines.
- . July 3rd—Thomas H. Whidden, aged 22, single. Cause—  
of a tub in a shaft at Goldenville.
- . November 3rd—David Ferguson, aged 12. Cause—  
by counterbalance on plane-way, Spring Hill.
- . December 13th—J. R. McDonald, aged 26, single.  
fall of roof in the Foord pit, Albion Mines.

### EXPLOSIONS OF GAS.

Four explosions of gas were reported to have injured more  
rely six persons. Besides these no others were heard of.  
The first happened February 13th, at the Vale.

morning, was reported to be in small quantity in a winning headway, and Archibald McDonald was told to brush it out. He was doing so when his partner followed with a naked light on his head, and meeting the gas it fired and burnt them both on the hands and face. Neil McDonald was tried before the Stipendiary Magistrate and fined for disobeying orders. It is by making examples of such cases where instructions are knowingly disobeyed that proper discipline alone can be maintained.

A somewhat similar accident occurred at the Nova Scotia, June 27th. A small accumulation of gas was known to have taken place in a close head while the miners were temporarily absent. They were provided with safety lamps, and Waters proceeded on his return to brush out the gas. He did so, but drove it down upon the loader, Thomas McDonald, in the bord below, where he supposed himself out of harm's way. They were both burned, McDonald only slightly, but Waters severely on the arms.

No trace of gas was ever seen, so far as diligent enquiry could discover, in the workings of the Black seam at Spring Hill, until October 1st, when Henry McNeil was most severely burnt under the following peculiar circumstances in a heading off the lowest east level. Ten yard pillars are left to protect the levels, and the heading was up 55 feet and ahead of the first bord. It had been measured up on the Saturday and no gas discovered. On the Monday morning, McNeil, before beginning work, entered this heading by climbing over the breastwork that protects the level at the foot. He merely entered on the flat place filled up behind the breastwork, a distance of 5 feet, and while there, uncovered, some gas fired and burnt him severely. Immediately above him was a bulkhead put half-way across the place and to within 9 inches of the top, placed to catch any coal rolling down; for the seam is deep and dips at an angle of 40°. That the place could not have been standing full of gas is evident from the accounts of men working in the vicinity, of what they saw and heard, and had it been so the explosion would have done great damage. It is equally clear that the man had not climbed to the face and also that the gas came upon him after he had entered. To account for it in such a place it is supposed that either it was liberated from among the bat under the man's feet, or that a collection of gas at the face had been gently dislodged by the increased circulation due to the slanting of the pit, and brought down over the bulkhead while McNeil was present. That McNeil was injured by an explosion of gas was confirmed on the 13th of the same month, when John Culton, on reaching the face of his heading, fired with his light a small quantity of gas which burnt his right arm. The night watchman affirms that when he visited the place at 4 A. M., he carefully examined but found no gas. Mr. Hall, the manager, speaks confidently of the efficiency of the watchman, and as he himself has had much experience with gas, it is to be hoped that these cases have been sufficient to demonstrate the necessity for exercising that constant care and watchfulness that all mines generating gas require.

---

An explosion took place in January, 1876, at Linga, whereby one man was badly burnt, which was not mentioned in the last Report. When knowledge of it came to my ears, enquiry was made and it appeared a letter reporting it had been written, but had miscarried.

spots, as the sinking went down, and every Saturday three or four hours 'shaking' the shaft, i. e. sounding the rock with pieces, and examining for any scaling off of the strata. This was done on May 12th, and two half cribs put in at weak places. The man in charge of the shaking party, two days after told the head sinker that there was another weak spot, but that he did not think it so bad as to require immediate attention, especially as it was determined to begin regularly cribbing the shaft the following week. On the Wednesday night following, while the shift composed of men were at work, a piece of shale became detached, fell about 100 feet, and a fragment of it struck the chargeman, John Walker, on the head, and instantly killed him. One of the other men at the time received a scalp wound. At the inquest it appeared that the fallen piece came from the spot referred to by Deeson from the bottom. As regards the precautions taken, it was the evidence that they were the same as had been along since the beginning in 1866, and no similar accident had hitherto happened. It was also said that complaints had more than once been made that the state of the pit was not safe, and one of the witnesses expressed his opinion that the 'shaking' was not thorough. In consequence of this evidence, the jury requested the coroner to call my attention to the case. Accordingly I held an inquiry, at which the representatives of each shift of men appeared. As far as possible, the evidence was reviewed, and the opinions of the sinkers and men were taken from their representatives. But it seemed that in no case had any matter brought to the attention of those in charge been neglected. That, the jury were misled by the word 'complaint' having been used by the men, to express an opinion that certain matters were attending to. The liability of the officials was acknowledged, the head sinker being in full charge under the engineer. I expressed my opinion that had the manager or engineer interfered when a question of safety was raised, they would have relieved the head sinker and the men of their responsibility. In this case they had not done so. The question of blame or error in judgment, then rested with the men. The chargemen Deeson in his evidence, stated that he had told Walker on Monday, that a certain spot was not safe without further work. He did not come before me when Walker said that Deeson had qualified his report by remarking that he did not think it so bad as to require immediate attention, a qualifying clause I am inclined to think was probably made, considering Deeson did not make his report until after two or more shifts had been at work, after he had made his examination.

The men who examined the shaft were selected, because of their experience, and if they erred in judgment, they subjected themselves to the same risks to which they exposed their fellow-workmen. That any of the sinkers had protested against any practice complained of any neglect, I could get no direct evidence, and consequently concluded either that the dangerous character of the shaft noticed by Deeson, had been underestimated, or that its character had not been impressed with sufficient clearness on the head sinker. On June 20th, John Burchell was employed driving the hoist gin, by which two men at work repairing the pump collars in the Queen pit, were lowered down.

---

While the waiter-on at the shaft top was tying a piece of timber across the opening, to prevent the gin rope from chafing, Burchell walked over to the top and stood looking at him.

The waiter-on heard Burchell give a quick cry, and looking up saw him in the act of falling. He fell to the bottom a distance of 360 feet.

It is presumed that he must have had a return of the fits to which he had been subject some years before, otherwise it is supposed had he only tripped over an obstacle, he could not have failed to have caught the planking over the shaft top, as the portion uncovered was so small.

July 3rd, The third fatal accident in shafts occurred in a gold mine at Sherbrooke.

A young man named Whidden, had only been about Goldenville a few weeks, when he was employed to fill the tubs at the bottom of the gin shaft, on the Dewar lead. He was instructed to get out of the bottom when the tubs were going up, yet more than once neglected to do so. Even on the morning of the 3rd July, he had been again warned, but either believing himself secure, or deterred by the trouble of getting in and out of the bottom, he continued to remain; and as it most unfortunately occurred, he was at the bottom when the rope happened to break and drop the loaded tub on him. The injuries he received resulted in his death within a few hours.

#### FALLS OF STONE AND MINERALS.

Reports were received from Londonderry in January and October, of falls of iron ore in the stopes having injured two men severely. The character of the ore is such, that in taking it down, a miner may be at times deceived as to the quantity his operations may loosen, and hence it is only experience and judicious timbering that can guard against accidents from this source.

The fifth accident which terminated fatally, was occasioned by a fall of stone in the Foord pit, December 13th. The timbering of the places is done by the men themselves in this pit, though the timber is delivered to them. An examination of McDonald's place showed that the 'lype' from which the stone broke away, over-ran a boom that had been put up, but not properly set in the coal, so that when the weight came on the boom, the coal gave way. The instructions to the colliers are to cut the holes for the booms not less than 6 inches deep. In this case the Deputy found the hole to be only three inches deep.

#### MISCELLANEOUS CASUALTIES.

February 15th, Alexander Gillies, 13 years of age, jumped on the rake after it had started from the bottom of the plane in the Cage pit, Albion Mines, and in getting off before it stopped at the top, slipped and was run over. One of his legs had in consequence to be amputated. Riding on the rake is forbidden by the rules of the colliery, hence the boy's desire to get off before he was caught at the top.

June 9th, William Cathcart met with serious injuries in a most foolhardy way. It seems that to save himself from going round the



## LIST OF MINERAL LEASES (OTHER THAN COAL.)

No.	LESSOR.	DISTRICT.	Area Sq. Miles.
	<b>COPPER.</b>		
	COLCHESTER Co.		
	Moir, Wm. C et al.....	Tatamagouche .....	10½
	<b>LEAD.</b>		
	HALIFAX Co.		
1	McClure, Charles F.....	Gay's River .....	1
	<b>IRON.</b>		
	PICOU Co.		
32, 33, 34, 36, 37, 38, 40, 41	Hamilton, John and others.....	East River.....	9
39	Hudson, James.....	"	1
35	Carmichael, John R.....	"	1
	CAPE BRETON Co.		
84	Protheroe, Pryse.....	Cow Bay.....	1
	INVERNESS Co.		
16	Inverness C. I. & R. Co.....	Whycocomagh.....	1
Total area under lease .....			24½ square miles.

LIST OF COAL LEASES.

No.	LESSEE.	COLLIERY.	Area Sq. Miles.	WORKING.	AGENT AND MANAGER.	POSTAL ADDRESS.
1	McKinnon, et al.....	ANTIGONISH Co.	3			
44	Baker, John W.....		1			
13, 14, 15	Black, C. H. M.....		3			
21	Blight, James, et al.....		1		John Moffat .....	River Hebert.
11	Bradley, Benj.....		1			
25	Campbell, Alex., et al.....		1			
32, 34	Campbell, Alex., et al.....		2			
35	Campbell, Alex.....		1			
31, 33, 37, 38, 40, 41, 45, 46	Campbell, John.....		8			
12	Cumberland C. M. Co. ....		4			
17	Domville, James.....		3		E. N. Sharp .....	St. John, N. B.
	General Mining Association.		4			
	Joggins C. M. Association..	Joggins.....	2	working	{ B. B. Barnhill ... Robert Redpath..	Joggins.
	Joggins C. M. Co.....	Cumberland. ....	2			
20	Kirby, Lewis R.....		1			



43	Pugwash & Spring Hill R. Co.	.....	1	working	<i>William Hall</i> .....	Spring Hill.
16	Seaman, Gilbert.	.....	1		J. S. Hickman.....	Amherst.
24	Shaunon, S. L.	.....	2			
36, 39	Shannot, S. L., (in trust) et al.	.....	2			
6, 7, 8	Spring Hill Mining Co.	Spring Hill.....	3			
22, 23, 28, 29, 30	Styles Mining Co., (Limited)	.....	5			
9	Victoria Coal Mining Co.	.....	2			
26, 27	Wright, John V.	.....	3			
			61			
		Pictou Co.				
1	Acadia Coal Co.	Fraser.....	1	working	Jesse Hoyt.....	Stellarton.
3	"	Acadia.....	1			
19, 21, 22	"	Pictou.....	4			
23	Allan, Sir Hugh, Kt.	Vale.....	3	working	{ J. B. Moore..... <i>John Greener</i> ...	New Glasgow. Vale Colliery.
10	Gray, B. G.	.....	1			
11	Haliburton, R. G., et al.	.....	1			
	Halifax Company, (Limited)	Albion.....	4		{ S. Cunard & Co.. <i>James Hudson</i> ...	Halifax. Stellarton.
13, 14	Intercolonial Company.	.....	2	working	Robert Simpson....	Westville.
12	"	Drummond.....	1			
6	Kirby, Lewis R., et al.	.....	1			
15, 30, 31	Merigomish Company.	.....	3			
25	Nova Scotia Company.	Black Diamond....	4	working	W. W. White.....	Westville.
20	Price, D. E., et al.	.....	2			
24	Richey, M. H.	.....	1			
			29			

## LIST OF COAL LEASES.—Continued.

No.	LESSEE.	COMMET.	Area Sq. Miles.	WORKING.	AGENT AND MANAGER.	POSTAL ADDRESS.
3	Archibald, Blowers.....	CAPE BRETON CO.				
2	Archibald, Thos. D.....	Gowrie.....	1	working	{ Archibald & Co., Chas. Archibald..	North Sydney. Cow Bay.
5, 28	Blockhouse Mining Co.....	Blockhouse .....	2	working	R. Belloni.....	Cow Bay.
29	" " (see area)	.....	1			
72	Brookman, Samuel.....	.....	1			
76, 77	" S., et al.....	.....	2			
15	Caledonia, C. & R. Co.....	Caledonia. ....	1	working	David MacKeen....	Caledonia Mines
31	" (see area).....	.....	1			
30	Campbell, Alex.....	.....	1		T. D. Archibald ...	North Sydney.
23, 25, 70	Cape Breton Co., (Limited) ..	.....	3		Edgar Stirling.....	Sydney.
14, 24	" " " " " " " " " "	Schooner Pond .....	2		" " " " " " " "	
49	" " " " " " " " " "	Reserve.....	1		" " " " " " " "	
64, 65, 68	" " " " " " " " " "	Lorway .....	3		" " " " " " " "	
69	" " " " " " " " " "	Emery .....	1		" " " " " " " "	
8, 9	Clyde Coal Mining Co.....	Ontario .....	1 1/4	working	John Sutherland ..	Port Caledonia.
	General Mining Association.	Bridgeport.....	2			
	" " " " " " " " " "	Sydney.....	5	working	{ Rich'd H. Brown. Cunard & Morrow	Sydney Mines. Halifax.
	" " " " " " " " " "	" " " " " " " " " "	12			
27	" " " " " " " " " "	" " " " " " " " " "	5			





COAL TRADE BY COUNTIES.  
TABLE A.

	CUMBERLAND.		PICTOU.		CAPE BRETON.		OTHER COUNTIES.		TOTAL.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter.....	12,769	11,509	76,793	33,583	30,225	2,751	360	.....	120,147	47,843
2nd Quarter.....	28,879	26,595	70,467	55,068	80,639	63,903	1,350	513	181,335	146,079
3rd Quarter.....	30,071	27,203	80,317	114,888	137,046	148,451	1,103	247	248,537	290,789
4th Quarter.....	35,285	33,771	78,900	80,616	92,506	86,876	786	1,091	207,477	202,354
Total.....	107,004	99,078	306,477	284,155	340,416	301,981	3,599	1,851	757,496	687,065
1876.....	93,232	84,528	306,390	275,618	304,102	268,808	5,922	5,253	709,646	634,207
1875.....	64,797	60,944	382,662	337,102	328,425	304,702	5,281	4,047	781,165	706,795
1874.....	51,580	49,599	410,876	357,926	404,268	337,016	5,996	4,586	872,720	749,127

COAL TRADE BY COUNTIES.  
TABLE B.

MARKET.	CUMBERLAND.		PICTOU.		CAPE BRETON.		OTHER COUNTIES.		TOTAL.		Grand Total.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	
Nova Scotia—											
Land Sales.....	12,143	3,263	51,441	36,534	1,587	4,981	4	2	65,175	44,780	109,955
Sea-borne.....	912	90	46,612	10,293	83,239	3,338	1,351	....	132,114	13,721	145,835
Nova Scotia—Total..	13,055	3,353	98,053	46,827	84,826	8,319	1,355	2	197,289	58,501	255,790
Quebec.....	....	....	64,709	288	29,906	....	215	....	94,830	288	95,118
New Brunswick....	68,241	14,081	6,716	1,045	13,623	....	212	....	88,792	16,026	104,818
Newfoundland.....	....	....	1,413	22	47,629	262	16	....	49,058	284	49,342
P. E. Island.....	....	....	14,669	23,243	6,114	1,092	51	....	20,834	24,335	45,169
United States.....	348	....	21,118	123	87,029	9,598	....	....	108,495	9,721	118,216
West Indies.....	....	....	4,756	....	8,904	....	....	....	13,660	....	13,660
S. America.....	....	....	273	....	300	....	....	....	573	....	573
Europe.....	....	....	....	....	4,379	....	....	....	4,379	....	4,379
Total.....	81,644	17,434	211,707	72,448	282,710	19,271	1,849	2	577,910	109,155	687,065
1876.....	68,377	16,151	217,530	58,088	247,001	21,807	5,121	132	538,029	96,178	634,207

## COAL SALES.

MARKETS.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1877.	1876.
Nova Scotia—						
Land Sales..	38,518	17,509	13,067	40,861	109,955	80,411
Seaborne....	946	28,168	67,992	48,729	145,835	145,247
Nova Scotia Total	39,464	45,677	81,059	89,590	255,790	225,658
Quebec.....	20,808	20,808	61,960	12,350	95,118	117,303
New Brunswick..	7,854	28,638	32,434	35,892	104,818	101,890
Newfoundland...	525	9,577	20,300	18,940	49,342	51,742
P. E. Island.....		7,712	24,052	13,405	45,169	46,908
United States....		29,515	68,795	19,906	118,216	71,634
West Indies.....		3,618	1,121	8,921	13,660	17,971
S. America.....				573	573	.....
Europe.....		534	1,068	2,777	4,379	1,101
Total.....	47,843	146,079	290,789	202,354	687,065	634,207
1876.....	32,607	161,788	260,250	179,562	634,207	634,207
1875.....	31,788	161,421	328,154	185,432	706,795	706,795

## COAL—GENERAL STATEMENT.

1877.	Produce.	Sales.	Colliery Consumption.
1st Quarter.....Tons.	120,147	47,843	26,749
2nd " .....	181,335	146,079	23,192
3rd " .....	248,537	290,789	22,211
4th " .....	207,477	202,354	26,689
Total.....	757,496	687,065	98,841
Total.....1876	709,646	634,207	113,788
Total.....1875	781,165	706,795	124,110
Total.....1874	872,720	749,127	119,582

NOTE.—Stocks on hand at the end of the year 17,060 tons.





Statement of the number and classes of persons employed, and average results at each Colliery, during the year ended Dec. 31st, 1877.

COLLIERIES.	Underground.				Surface.				Construction.		Total.		Average No. of days per person.		Average tons cut per day.	Average quantity raised per day—Tons.	Horses.		Pits Worked.	
	Cutters.	Laborers.	Boys.	Days Labor.	Mecha-nics.	Laborers.	Boys.	Days Labor.	Persons.	Days Labor.	Persons.	Under-ground.	Surface.	Average No. of tons per cutter.			Average tons per day per cutter.	Above.		Below.
Cumberland .....	15	3	4	449	2	5	1	736	6	409	36	1,594	3	49	95	1.5	23	1	5	61
Joggins .....	32	4	13	8,549	8	7	3	4,394	2	155	68	13,098	178	244	319	1.9	61	3	9	168
Scotia .....	4	1	...	1,041	1	2	...	476	...	...	9	1,517	208	119	303	1.4	...	...	...	...
Spring Hill .....	113	39	30	50,302	19	47	7	20,919	11	1,527	266	72,748	276	286	828	2.8	320	4	9	289
Acadia .....	87	20	17	27,580	22	43	2	19,642	...	...	191	47,222	218	293	725	3.5	309	15	4	204
Albion Mines .....	209	36	65	66,311	34	104	29	49,569	...	...	477	115,880	214	297	550	3.8	{ D=306 M=451 }	17	27	{ D=68 M=211 }
Intercolonial .....	61	26	21	21,408	25	34	5	18,052	3	470	175	39,930	198	282	948	5.5	336	7	4	172
Nova Scotia .....	33	12	10	15,824	7	13	7	7,172	...	...	80	22,906	288	287	818	3.1	104	3	2	259
Vale .....	98	18	8	22,889	24	42	4	14,151	...	...	192	37,040	187	202	442	3.5	337	2	6	136
Block-house .....	72	9	35	22,993	21	21	2	10,785	26	4,068	186	37,746	197	245	860	5.9	430	7	27	144
Caledonia .....	47	3	8	10,785	11	19	3	6,357	...	...	91	17,142	186	192	557	3.3	158	5	8	165
Collins .....	19	6	7	6,667	...	...	3	836	3	...	51	12,469	208	304	407	2.2	41	2	2	189
Emery .....	...	1	1	713	3	3	1	1,975	8	124	17	2,812	366	281	...	...	...	1	...	...
Gardner .....	52	2	10	1,850	5	10	1	1,596	29	3,564	80	3,446	29	100	68	1.6	84	1	1	42
Glace Bay .....	71	5	14	15,185	22	12	7	10,189	29	...	160	28,938	168	248	511	2.8	199	8	7	182
Gowrie .....	62	7	22	12,542	11	23	3	7,772	1	...	10	20,324	138	165	454	3.8	238	6	18	118
International .....	32	10	10	8,977	21	12	15	7,753	8	608	98	17,388	173	204	573	5.8	189	8	10	97
Lingan .....	47	4	14	10,168	25	9	3	8,897	3	761	102	19,826	166	262	448	3.6	169	6	10	124
Ontario .....	28	7	2	7,134	6	31	6	6,376	...	...	77	13,510	192	156	478	1.8	51	3	2	264
Reserve .....	...	2	1	502	2	4	2	1,490	10	...	1	1,992	167	248	...	...	...	5	...	...
Schooner Pond .....	...	...	...	...	3	4	2	806	...	...	9	806	...	89	...	...	...	2	...	...
South Head .....	185	31	55	53,885	60	90	6	48,816	51	13,063	508	115,754	199	262	599	2.4	443	18	30	246
Sydney Mines .....	32	21	8	9,007	10	20	35	6,151	6	535	102	15,693	147	176	445	3.8	124	1	2	115
Victoria .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Broad Cove .....	6	...	...	965	1	4	1	80	6	503	18	1,548	161	13	118	3.4	7	1	2	54
Port Hood .....	2	...	...	110	2	...	...	110	...	...	4	220	55	55	183	...	...	...	...	...
New Campbellton .....	13	4	3	3,549	4	7	3	2,010	...	...	34	5,559	177	143	194	1.1	14	3	...	181
	1,318	270	358	379,285	324	1505	152	261,140	163	26,723	3,180	667,148	195	241	575	3.7	219	129	175	156



## INTERCOLONIAL RAILWAY.

*Statement of Coals received at the several Stations from Mines in Nova Scotia, for the year ended 31st December, 1877.*

STATIONS.	Quantity Tons.	STATIONS.	Quantity Tons.
Halifax .....	13,736	O'Brien's .....	24
Three Mile House .....	150	Nappan .....	34
Four Mile House .....	20	Amherst .....	1,128
Moir's .....	10	Aulac .....	36
Bedford .....	50	Sackville .....	814
Rocky Lake .....	10	Dorchester .....	22,312
Windsor Junction .....	4,644	Crowsens .....	24
Oakfield .....	20	Memramcook .....	138
Enfield .....	146	Shediac .....	148
Malcolms .....	346	Moncton .....	842
Elmsdale .....	58	Boundary Creek .....	6
Milford .....	30	Salisbury .....	1,440
Shubenacadie .....	346	Petticodiac .....	228
Stewiacke .....	152	Anagance .....	6
Brookfield .....	52	Penobscuis .....	24
Truro .....	4,088	Sussex .....	384
Valley .....	10	Apohaqui .....	30
Riversdale .....	6	Norton .....	42
West River .....	16	Passekeag .....	22
Hopewell .....	174	Hampton .....	508
Battery Hill .....	6	Nauweigaweik .....	6
Glengarry .....	10	Wathers .....	6
New Glasgow .....	2,500	Rothsay .....	196
Pictou Landing .....	78,186	Torryburn .....	10
Debert .....	62	Cord Brook .....	2,598
Londonderry .....	10,262	St. John .....	4,016
Wentworth .....	24	Chatham .....	66
Greenville .....	20	Miramichi .....	112
Thomson .....	18	Bathurst .....	72
Oxford .....	322	Campbellton .....	56
River Phillip .....	6	Charlo .....	18
Salt Springs .....	10	New Mills .....	6
Athol .....	18		
Maccan .....	24	Total .....	150,884

## MISCELLANEOUS NOTES.

### PORT OF HALIFAX.

#### IMPORTS.—COAL.

	1876.	1877.
Anthracite from United States.....	6,439	6,534
Bituminous from Nova Scotia ports .....	123,420	71,310
" " Great Britain .....	2,635	1,396

#### EXPORTS DURING 1877.

	Quantity.	Value.
Coal.....	703 Tons	\$1,851
Copper Ore.....	15 "	710
Manganese Ore .....	12 "	383
Iron Ore.....	2 "	5
Other Articles of the Mine.....	.....	675

### DOMINION OF CANADA.

*Quantities and Values of Coals Imported and Exported during the year ended 30th June, 1877.*

COUNTRIES.	IMPORTED.		EXPORTED.	
	Quantity. Tons.	Value.	Quantity. Tons.	Value.
Great Britain .....	189,965	\$ 484,699	184,169	\$ 473,154
United States .....	789,697	3,176,154	3,675	14,321
St. Pierre .....	30	75	2,295	13,666
Newfoundland .....	.....	.....	1,412	2,240
British West Indies .....	.....	.....	155	.....
Spanish " .....	.....	.....	.....	.....
French " .....	.....	.....	.....	.....
Mexico .....	.....	.....	.....	.....
South America.. .....	.....	.....	.....	.....
Total .....	979,692	\$ 3,660,928	254,933	\$ 490,381

Of the Exports Nova Scotia shipped 147,983 tons.

#### IMPORTED COALS, 1876-77.

	Anthracite.	Bituminous.	
From Great Britain.....	4,111 Tons.	160,175 Tons.	25,6
United States.....	415,869 "	353,795 "	20,0
St. Pierre .....	30 "	.....	...
Total.....	420,010	513,970	45,7

### INTERCOLONIAL RAILWAY.—1877.

COAL forwarded from—				COKE from Albion Mines to—	
Acadia Mines....	66,058 Tons.			Londonderry.....	11,014 T.
Albion " ....	11,510 "			Halifax.....	60
Drummond " ....	4,344 "			Truro .....	90
Vale " ....	32,050 "			Memramcook .....	6
Spring Hill " ....	36,922 "			Total....	11,170
Total....	150,884				

#### COAL AND COKE RECEIPTS FOR RAILWAY USE.

	Albion Mines.	Vale Mines.	Spring Hill.
Round, Tons.....	28,822	50	49,8
Small " .....	823	30	10
Coke " .....	85	..	..
Total....	29,730	80	49,8

## GOLD.

## GENERAL STATEMENT FOR THE YEAR 1877.

*Shewing the number of Mines at work, days labour performed, quantities of Quartz, &c., crushed, yield of Gold, &c., &c., for the twelve months ended December 31st.*

DISTRICTS.	Number of Mines.	Days Labour.	Mills Employed.	Steam Power.	Water Power.	Quartz, &c., Crushed.	Yield per Ton.			Maximum yield per Ton.			Total yield of Gold.			Average yield per man per day for twelve months, at \$18.00 per oz.
							oz.	dwt.	gr.	oz.	dwt.	gr.	oz.	dwt.	gr.	
Caribou .....	5	14,579	2	2	....	1,735	1	9	21	42	17	....	2,596	13	23	\$3.20
Gay's River .....	2	3,151	1	1	....	859	....	5	20	....	14	22	251	3	15	1.39
Montagu .....	2	1,404	1	1	....	55	....	18	5	....	7	....	50	1	9	0.64
Oldham .....	8	14,144	2	....	2	2,015	1	5	2	17	14	12	2,527	19	13	3.21
Renfrew .....	1	3,543	1	....	1	294	....	14	3	1	3	14	207	13	4	1.05
Sherbrooke .....	13	47,725	5	2	3	8,654	....	19	1	3	16	16	8,237	3	10	3.10
Stormont .....	1	3,310	....	....	....	96	2	10	4	4	....	....	240	19	....	1.30
Tangier .....	2	5,102	2	....	2	364	1	2	13	3	8	9	410	14	15	1.42
Uniacke .....	4	7,252	2	2	....	470	1	8	6	4	19	9	663	15	9	1.64
Waverley .....	4	14,261	2	1	1	1,422	....	12	4	2	11	20	866	18	10	1.09
Wine Harbor .....	3	5,772	2	1	1	1,068	....	10	21	2	4	12	580	14	3	1.80
Unproclaimed, &c. ....	2	3,322	3	....	3	337	....	14	15	2	9	19	248	9	19	1.34
	47	123,565	23	10	13	17,369	....	19	10	42	17	....	16,882	6	1	\$2.46

1877.  
MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

	CARIBOU.							GAY'S RIVER.							MONTAGU.						
	No. of Miners.	Days Labor.	Men.	Tons.	Op.	Dts.	Gr.	No. of Miners.	Days Labor.	Men.	Tons.	Op.	Dts.	Gr.	No. of Miners.	Days Labor.	Men.	Tons.	Op.	Dts.	Gr.
January.....	4	1,029	40	26	14	7	..	2	572	22	250	*62	9		1	119	5	14	5	4	4
February.....	4	1,176	170	170	404	3	13	2	367	14	180	22	..		2	65	3	6	1	18	..
March.....	4	905	35	70	124	10	..	2	101	4	..	..	..		1	115	7	3	2	19	9
April.....	5	1,447	55	176	475	3	9	1	108	4	36	8	14		..	..	..	..	..	..	..
May.....	6	1,669	64	125	373	14	8	2	189	7	37	10	19		3	145	6	11	2	16	..
June.....	6	1,365	52	124	131	12	10	2	292	11	5	1	9		2	51	2	13	9	19	4
July.....	7	1,084	37	153	217	16	19	2	160	6	80	26	8		2	62	2	4	..	13	12
August.....	6	1,583	57	158	213	0	9	2	248	9	75	*25	9		2	123	5	..	+	14	..
September.....	5	1,486	54	279	207	1	4	2	220	8	40	18	19		1	95	4	..	..	..	..
October.....	5	1,267	49	210	159	10	18	2	404	15	47	16	18		2	105	4	6	6	8	15
November.....	4	939	36	138	124	9	4	2	282	18	61	22	..		4	267	3	3	11	11	19
December.....	4	629	24	106	151	5	1	2	208	8	48	35	17		3	257	3	5	7	16	18
	5	14,570	..	1735	2596	13	23	2	3,151	..	859	251	3	15	2	1,404	..	55	50	1	9

\* 21.13.1 from copper plates.  
3.13.0 ..

† 0.14.0 from boulders.

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(Continued.)

	OLDHAM.								RENFREW.								SHERBROOKE.							
	No. of Miners.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.	No. of Miners.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.	No. of Miners.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.			
January.....	13	1,489	57	231	206	16	9	1	20	1	...	...	...	...	8	3,861	149	760	652	6	..			
February.....	12	1,153	44	109	155	2	11	1	233	9	...	...	...	...	8	3,312	138	597	553	12	..			
March.....	13	1,384	53	285	177	11	10	1	139	5	20	13	8	20	9	3,752	144	890	766	2	..			
April.....	14	1,169	45	189	268	2	3	2	361	14	25	23	16	16	11	3,700	142	705	1050	18	15			
May.....	11	1,473	57	229	266	15	5	2	542	21	...	...	...	...	11	3,780	145	678	882	..	..			
June.....	14	1,920	74	224	556	5	22	2	525	20	70	40	7	5	12	3,640	149	589	668	13	13			
July .. . . .	2	714	27	260	329	1	11	1	399	15	7	7	2	20	14	3,718	143	720	536	6	12			
August.....	3	917	35	219	343	19	16	1	73	3	5	5	17	3	14	4,320	166	709	548	8	..			
September....	3	812	31	37	14	19	19	2	235	9	41	16	2	12	16	4,870	176	775	644	3	17			
October.....	5	1,132	43	160	172	7	1	2	385	15	20	10	16	..	18	4,752	183	737	640	18	..			
November....	3	968	37	25	14	4	..	3	395	15	65	54	15	..	16	4,160	160	866	750	16	..			
December.....	3	1,013	39	47	22	14	2	1	236	9	41	35	7	..	15	4,160	160	664	542	19	1			
	8	14,144	....	2015	2527	19	13	1	3,543	....	294	207	13	4	13	47,725	....	8654	8237	3	10			

## MINES REPORT.

1877.  
MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

	CARIBOU.							GAY'S RIVER.							MONTAGU.						
	No. of Mines.	Days Labor.	Men.	Tons.	Op.	Dats.	Gr.	No. of Mines.	Days Labor.	Men.	Tons.	Op.	Dats.	Gr.	No. of Mines.	Days Labor.	Men.	Tons.	Op.	Dats.	Gr.
January.....	4	1,029	40	26	14	7	..	2	572	22	250	*62	9	7	1	119	5	14	5	4	4
February.....	4	1,176	170	170	404	3	13	2	367	14	180	22	..	..	2	65	3	6	1	18	..
March.....	4	905	35	70	124	10	..	2	101	4	...	...	..	..	1	115	7	3	2	19	9
April.....	5	1,447	55	176	475	3	9	1	108	4	36	8	14	..	..	...	...	...	...	..	..
May.....	6	1,669	64	125	373	14	8	2	189	7	37	10	19	..	3	145	6	11	2	16	..
June.....	6	1,365	52	124	131	12	10	2	292	11	5	1	9	..	2	51	2	13	9	19	4
July.....	7	1,084	37	153	217	16	19	2	160	6	80	26	8	..	2	62	2	4	...	13	12
August.....	6	1,583	57	158	213	0	9	2	248	9	75	*25	9	..	2	123	5	...	+	14	..
September.....	5	1,486	54	279	207	1	4	2	220	8	40	18	19	..	1	95	4	...	...	..	..
October.....	5	1,267	49	210	159	10	18	2	404	15	47	16	18	..	2	105	4	6	6	8	15
November.....	4	939	36	138	124	9	4	2	282	18	61	22	..	18	4	267	3	3	11	11	19
December.....	4	629	24	106	151	5	1	2	208	8	48	35	17	3	3	257	3	5	7	16	18



## MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(Continued.)

	OLDHAM.							RENFREW.							SHIREBROOKE.						
	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Gra.	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Gra.	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Gra.
January.....	13	1,489	57	231	206	16	9	1	20	1	....	....	....	..	8	3,861	149	760	652	6	..
February.....	12	1,153	44	109	155	2	11	1	233	9	....	....	....	..	8	3,312	138	597	553	12	..
March.....	13	1,384	53	285	177	11	10	1	139	5	20	13	8	20	9	3,752	144	890	766	2	..
April.....	14	1,169	45	189	268	2	3	2	361	14	25	23	16	16	11	3,700	142	705	1050	18	15
May.....	11	1,473	57	229	266	15	5	2	542	21	....	....	....	..	11	3,780	145	678	882	..	..
June.....	14	1,920	74	224	556	5	22	2	525	20	70	40	7	5	12	3,640	149	589	668	13	13
July.....	2	714	27	260	329	1	11	1	399	15	7	7	2	20	14	3,718	143	720	536	6	12
August.....	3	917	35	219	343	19	16	1	73	3	5	5	17	3	14	4,320	166	709	548	8	..
September....	3	812	31	37	14	19	19	2	235	9	41	16	2	12	16	4,870	176	775	644	3	17
October.....	5	1,132	43	160	172	7	1	2	385	15	20	10	16	..	18	4,752	183	737	640	18	..
November....	3	968	37	25	14	4	..	3	395	15	65	54	15	..	16	4,160	160	866	750	16	..
December.....	3	1,013	39	47	22	14	2	1	236	9	41	35	7	..	15	4,160	160	864	542	19	1
	8	14,144	....	2015	2527	19	13	1	3,543	....	294	207	13	4	13	47,725	....	8654	8237	3	10







## OTHER THAN GOLD.

*Mines Department for 13 months, ended December 31st, 1877.*

COUNTRIES.	RECEIPTS.				EXPENDITURE	
	Licences to Search.	Licences to Work.	Royalty.	Totals.	Return Licences to Search.	Totals.
Annapolis.....	20 00	.....	.....	20 00	.....	.....
Antigonish.....	220 00	125 00	.....	345 00	.....	.....
Cape Breton.....	360 00	375 00	35,827 13	36,562 13	.....	.....
Colchester.....	100 00	.....	.....	100 00	.....	.....
Cumberland.....	540 00	.....	7,920 41	8,535 41	20 00	20 00
Guysboro.....	140 00	.....	* 15 87	155 87	.....	.....
Hants.....	40 00	.....	.....	40 00	20 00	20 00
Inverness.....	180 00	100 00	.....	280 00	.....	.....
Pictou.....	120 00	100 00	22,405 70	22,625 70	.....	.....
Victoria.....	80 00	.....	258 25	338 25	.....	.....
	\$ 1,800 00	775 00	66,427 36	\$ 69,002 36	\$ 40 00	\$ 40 00

\*Royalty on lead.









**REPORT**

**OF THE**

**DEPARTMENT OF MINES,**

**NOVA SCOTIA,**

**FOR THE YEAR 1878.**

---

1

**HALIFAX, N. S.:**  
**ROBERT T. MURRAY, QUEEN'S PRINTER,**  
**1879.**

2155

# CONTENTS.

---

	Page
The Coal Trade .....	8
Coal Mining in 1878—Cumberland County.....	13
Pictou .....	14
Cape Breton.....	17
Other Counties .....	19
Gold Mining.....	20
Caribou.....	28
Fifteen Mile Stream and Gays River.....	29
Lawrencetown, Montagu.....	30
Waverley, Oldham, Renfrew .....	31
Sherbrooke, Stormont, Tangier.....	32
Uniacke, Wine Harbor.....	33
Accidents in 1878 .....	33
Explosions of Gas.....	34
Boiler Explosions.....	38
Explosion of Powder.....	43
Falls of Coal, &c.....	43
Miscellaneous Casualties.....	43
Relief for the Wounded.....	44
List of Mineral Leases other than Coal .....	46
“ Coal Leases and Lessees, &c.....	47
<b>TABLES.—COAL.—</b> Trade by Counties.....	52
General Statement.....	54
Colliery Production.....	55
“ Labor, &c.....	56
“ Construction Account.....	57
Coal Sales, 1785—1878 (inclusive) .....	58
Exports to U. S. States, 1850 to 1878 .....	59
<b>GOLD.—</b> General Statement, 1878.....	60
District Statements.....	61
General Annual Summary.....	65
District Annual Summaries, 1862—1878.....	65
Intercolonial R. R. Trade.....	71
“ “ Coal Consumption .....	72
Miscellaneous Notes .....	73
Financial Statements.....	74

## ERRATA.

---

Page 7, last line, for "Greenfield" read Greenville.

" 8, 5th " insert "then" after the depression and.

" 9, 11th " for "also" read only.

" 9, 26th " for "members" read numbers.

" 11, 18th " period after "trade," and continue sentence after "Provi  
line) into 20th line.

" 12, 10th " for "slow" read slowly.

" 12, 16th " for "was" read were.

" 12, 37th " read the average was only 240 tons.

" 14, 23rd " for "the" read this.

" 17, 30th " for "full" read fall.

" 17, 36th " read question.

" 19, 17th " for "log wharf" read long.

" 19, 33rd " for "drops" read dips.

" 22, 4th " for "laminæ" read laminæ.

" 23, 20th " read, "It does appear, however."

" 24, 1st " read scaffolds.

" 24, 19th " for "off-shots" read off-shoots.

" 26, 7th " for "place" read plane.

" 26, 26th " for "marked" read worked.

" 26, 49th " insert "In the Report of 1874" the accompanying plan of

" 27, 38th " for "when" read where.

" 27, 40th " for "strice" read strise.

" 29, 11th " read Touquoy.

" 30, 14th " for "fender" read feeder.

" 31, 8th " for "bulk" read hulk.

" 31, 9th " for "holding" read holeing.

" 33, 14th " read 20 fathom level to.

" 36, 41st " read a place not daily examined.

" 39, 33rd " read test 150 lbs.

" 40, 3rd " for "scales" read scale.

" 40, 14th " for "the end" read the ends.

" 42, 25th " read the ~~rent~~ between the rivets ~~was~~.

" 43, last " read caught by the coal.

" 44, 5th " for "badly" read baldly.

# DEPARTMENT OF MINES.

---

## REPORT

FOR THE YEAR 1878.

---

*To His Honor the Honorable ADAMS GEORGE ARCHIBALD, C. M. G.,  
Lieut.-Governor of the Province of Nova Scotia, &c., &c., &c.*

MAY IT PLEASE YOUR HONOR:—

The undersigned herewith begs to present to Your Honor the Annual Report of the Inspector of Mines, together with statistical information, compiled from official and other returns made to the Department of Mines, for the year 1878.

SAML. CREELMAN.

*Commissioner of Public Works and Mines.*

Halifax, January 27th, 1879.



# REPORT

ON THE

## INSPECTION OF MINES IN NOVA SCOTIA,

For the Year ending 31st December, 1878.

By HENRY S. POOLE, F. G. S., ASSOCIATE OF THE ROYAL SCHOOL  
OF MINES, &c.

---

HALIFAX, December 31st, 1878.

SIR,—In submitting a report on the mining operations in this Province during the current year, I am unable at this season to write of the extent to which the several branches of the Mining Industry have been conducted; for the Returns on which accurate statements can alone be made are not obtainable until the 1st of February next.

I have hence the honor merely of touching on, in a general way, some of the subjects and matters which hitherto I have ventured to treat of in detail. The appended statistical tables I presume will give as usual the pith of the information collected, at least on the two chief branches of the Mining Industry, Coal and Gold. The other most important branch, the Iron, has been conducted with increased energy by the Steel Company of Canada at Londonderry. One furnace has been steadily kept in blast, and in the mill a quality of bar iron produced which compares favorably with the best brands of imported iron.

The prospecting for Lead resulted unfavourably at Caledonia, the vein becoming even smaller and poorer under the river, and the rock so wet as to compel the abandonment of operations. Nor was the search at Pembroke for lead more successful.

Copper mining remains at a stand still, though the discoveries at Polson's Lake ultimately warrant a hope that before long Copper mining in Nova Scotia will be regularly established.

The usual quarries of gypsum, freestone &c., have been worked and have produced about the usual average quantity. Barytes on a small scale has been mined at Greenfield on the I. C. R.

## THE COAL TRADE.

ough the depressed condition of our Coal Trade has of some political discussion and has thus become a subject, it may not be altogether irrelevant to consider it on another stand point, the miners, and review first the condition and the means proposed to ameliorate the condition.

In 1850 our foreign exports of coal were chiefly to the United States and were about half of the total quantity marketed. Ten years previous to the reciprocity treaty, the amount exported to the neighboring Republic was about 100,000 tons a year. During the years immediately subsequent to the making of that treaty the exports averaged 30 per cent. on that quantity. But by the year 1865, the last year of the treaty, the exports had increased to 73 per cent. In the last year of the treaty, 1865, no less than 73 per cent. of the total sales of coal went to the United States.

Previous to the treaty the import duty had been 24 per cent. Subsequent to the treaty it was made specific, \$1.25 per ton. The ease of the trade during 1854—1865 was due not alone to the treaty, but also to the new agreement entered into, in 1858, between the Provincial Government and the holders of the Duke of Devonshire's General Mining Association; which agreement enabled the latter to profit by the treaty and supply additional quantities of coal then in demand. The lapsing of a treaty which had effected a duty seriously affecting a large proportion of the trade was the foundation of the present trouble; while the moment the trade continued it, though with lessening force for a few years, the channels. Similarly the momentum given to the coal industry by the provincial agreement with the Devonshire Association still continued to open new collieries, though to a lessening degree. Together, competition was aggravated. The competition was severely felt when the abnormal condition of the market gave temporary relief. Then followed that sudden change which makes the present state of the industry all the harder to bear. The decline of our exports after 1865, to New England, and the coal held passed into the hands of native producers of coal, who among themselves have in their turn cheapened the coal. And then our additional collieries, able to do more than the active demand at home, had to seek new markets in increased competition. Great Britain and the United States were alike affected by the wave of financial depression, and the producers of those countries also sought relief in exportation. We struggled for a portion of the trade with the West Indies and America, as was noticed in previous reports, but was



powered by her powerful competitors controlling return freights. As shipping also suffered with other industries, the decline left less difference over ocean freights in our favour to markets near at hand. English coal again competed with us in New England and deprived us of much of the vantage ground gained in ports on the St. Lawrence. At home competition became keen for the provincial consumption, now nearly one third of the present production.

At the time when the whole coal business was in the hands of the General Mining Association, the production was regulated by the demand, and the trade not being forced prices were maintained. The rates to consumers were also affected by freights. Since 1873 freights have continued to decline and now coal is sold to consumers at rates never before known.

Comparing the trade returns for a number of years a permanent though fluctuating progression is noticeable, each decade roughly speaking, doubling the output of coal. The annual sales of the present time are more than double what they were in 1858 when the trade was opened to competition. This year's output has exceeded that of the often-styled prosperous year of 1865 and though it has so and also that of the preceding year, it is regarded as most unsatisfactory, and naturally so for it has not been remunerative.

But then no more has coal mining generally been of late in England and the United States. Every one is familiar with the accounts of the extreme destitution and desolation of districts of South Wales but lately prosperous and thriving; and in the anthracite regions of Pennsylvania of the collapse of many companies, of the large sacrifices of members to keep their works in operation, and of the hardships endured by workmen forced to accept short time and starvation rates of wages. It is sufficient to call such circumstances to mind and to remember the conditions of those engaged in the trade abroad, to cause some feelings of resignation that trying as the times may be for us they are no worse than with our neighbors. But such feelings should not lead to apathy or occasion means for improvement to be left unconsidered and untried. Nor have they altogether, the coal owners have been solicitous to improve the condition of the trade. They have considered with politicians the prospects of restraining foreign importations, of fostering exportation by bounties, of encouraging home manufactories consuming coal, and of readjusting the tariff to favour mining and reduce the cost of material.

Besides the assistance to be had from government they have also open to their consideration a combination among themselves regulating the output proportionate to the demands of trade; and then there is the ever present question of economy in production.

The first of these considerations was discussed when the matter came up in 1875 and need not be again touched on; the latter is the constant aim of Mining Engineers and the several steps taken of late years have been duly noticed in these annual reports.

The question of the hour then with the coal miner is, how far ought a government to go in the way of fostering his trade. An industry that relies on an acquired reputation in addition to the excellence of the quality of its product is recognised as more difficult to

establish than one requiring only skill in its management. Is this class and shall it be protected? Some coal owners say it.

Before considering the bearing of the several proposed measures, it may be well to premise, that there are now mines open which are able to do more than supply the home demand and the foreign export trade; that such a condition is natural to every industry which is not a monopoly; and that unless affected by some violent fluctuation in every trade competitors are engaged in a struggle in which some are losers while success attends those who are favored by natural advantages, those who can command a preferred article, those who can work cheaper, transmit to market cheaper, or command labor through constant employment.

The facilities opened shortly before 1866 for mining and the circumstances then favourable for making the business profitable, drew capital into the country, capital which was not always judiciously expended, nor in directions that the trade warranted. And even when the limits of the demand were reached, new schemes were proposed which added to the keenness of the competition while the capital was being expended. They largely aided in making the present times harder to bear. Those familiar with the industry will bear me out when I say, that the opening of mines unwarranted by the condition of trade, prices were unduly advanced, men left their avocations to become miners, and their land run to waste to work underground. Subsequently they returned to their deteriorated farms with empty pockets and in debt. Better wages led to extravagant living and the contraction of debts, people with a little means put into businesses which apparently flourished when times were good, but when the tide turned left them poorer than before. The money that was expended through the country affected no permanent good. Such a result seems inevitable in times of excitement and in the development of new industries. It may be expected to re-occur and complete its cycle in due time.

The coal-master in looking for government assistance has suggested, 1st—that the royalty might be remitted; the second, that regard a royalty on coal as a special tax was discussed fully in 1876, and it was shown that by its remission the *Local* Government would gain no equivalent return though the output should be increased. It might also be shown that when the productivity of the mines is in excess of the home demand, prices will be regulated by foreign competition for the surplus, and that no change in the royalties will affect, with perhaps an exception or two, the profits on the home sales. A reduction would, in the main, go to the consumer. It would, however, favor the exporter. 2nd.—That a tax on imported coal would check foreign competition within the country, the tax favoring freights;—provided the relative value of the competing was the same.

But the conditions involved in the direct and indirect advantages to the trade and in the gain and loss to the country at large by a tax are so many, and the whole question is so involved that we cannot attempt to classify and consider them. It might, however, be asked whether a tax which checked importations from Great Britain would not so raise the rate of freight up the St. Lawrence

practically defeat the end in view, and increase the homeward freights on grain and lumber. It is also questionable whether a tax would stop the importation of hard coal which we cannot supply. It is certain that by it the exports would not directly be increased, and it is also certain that with it the Western consumer of coal must pay it or go back to the use of wood.

3rd.—That a bounty equal to the United States duty would put us on an equal footing in New England with the coal producers of Pennsylvania and Virginia, and discriminate in our favor against English coal; which of late, to the amount of 30,000 to 40,000 tons, has again been imported into Boston and sold at \$3.50 per ton: freight being as low as 70 cents per ton. It has even been sold as low as \$3 a ton in New York.

If the business of coal mining is to be fostered, a bounty is said to have this advantage over a tax: It would not bear unequally on different parts of Canada, nor interfere with the export trade of the St. Lawrence; while it would increase the exportations, and benefit the failing West India trade, while contemplating the several means open for winning the trade of the Upper Provinces.

There is another means of carriage which perhaps has hardly been fully considered: It is by rail. The course of trade is such that some 4,000 cars go west over the Intercolonial Railway empty, and freights going east are so encouraged that car loads of 100 barrels of flour are brought from Toronto for \$60 and \$65. It has even been stated that flour has been brought to Halifax from Chicago for \$55 per car. Now the railway moves from Toronto to Halifax for the sum of say \$60, flour weighing 10 tons, a car weighing also 10 tons, and also such cars as return empty 10 tons back, in all 30 tons; or in other words a weight of 10 tons is conveyed for \$20. Presuming that it pays to bring flour down for \$60 a car, and take the car back empty, it seems reasonable to suppose that a car load ought in preference to be carried back for \$20, plus a small percentage for detention and wear and tear, rather than an empty car, which actually costs, according to published average expenses, \$6, when taken a distance equal to that from Halifax to Toronto.

Coal in bulk could not well be sent in cars as at present constructed for carrying ordinary freight; but were it bagged as invariably is done in London for delivery, why should it not be carried say from Spring Hill, at \$2 per short ton. The total cost then at Toronto would be:—

Coal .....	\$1.70
Freight, say .....	2.10
Bags .....	.50

---

Total.....\$4.30 per 2000 lbs.

But as coal from the United States has lately been sold in Toronto at 3-35 per short ton, a protective duty of \$1 a ton would be required to give command of the trade in this way.



---

trade be unduly encouraged, and every holder of an unworked lease, will strive to place his property on the market, encouraged in the belief that his coal is the best, "just as every crow thinks its own chick fairest" An honest competition, and a gradually increased demand, if only attainable, are much more desirable for the trade, the country, and the workingman.

---

## COUNTY OF CUMBERLAND.

---

### COLLIERIES.

JOGGINS.—The workings of the present lift have reached their extreme limits on the east level to the heavy fault; and to the west the workings have been stopped on account of the greater thickness of the parting. The advantages of the system adopted, by which almost the whole of the seam is won, has been interfered with by the irregularity of the demand and the reduction of the trade in consequence of the low freights bringing other coals in closer competition in the St. John market.

SCOTIA.—The small quantity of coal that has been sold of late has been taken from the top of the combined seams immediately to the rise of the Chignecto pit, where the section shows some  $7\frac{1}{2}$  feet of coal and only 1 foot of fire-clay. Openings have been made by a small slope and an adit, which will prove of service in drawing off surface water from any deeper workings.

SPRING HILL.—Doubt of the existence of two workable seams where one only was previously supposed can no longer be entertained. The faces of what were thought to be approaching levels have now passed one another fully five chains. In order to profit by this fortunate discovery, a stone drift has been driven on the west side of the fault from the lowest level of the overlying or Black Seam to the underlying or South Seam, and the latter was reached at a distance of 175 feet. The coal of the underlying seam was found to be 9 feet 9 inches thick. Levels have been opened in the seam and a heading driven to intersect the workings from the West or Hall slope. From the latter levels have been driven to the east to meet the heading from the new winning; and to the west 22 chains into coal reduced to 3 feet 8 inches.

In the overlying Black Seam the levels going west are to the barrier of the General Mining Association's area, and east they are in 42 chains to a heavy fault which lies N. 15 E. or nearly level course. At the face the seam dips at an angle of  $50^{\circ}$  and the upper coal is reduced to 3 feet in thickness. The lower portion of the seam, separately worked, also thins to the east.

The ventilation in the summer did not exceed 11,000 cubic feet per minute, a quantity certainly not superabundant; and means of increasing the supply were strongly recommended. As the fan in its present position is comparatively of little use it is considered best to erect a fan.

The pumping facilities have been increased by the addition of a Blake pump of the following dimensions: cylinder 28 inches; plunger 10 inches; stroke 3 feet. To it is attached a Guttenberg lenser which gives  $19\frac{1}{2}$  inches of vacuum, and which besides the power of the pump gives greater smoothness of action and relieves the troublesome waste steam.

The agreement, between the lessees of this colliery and the Mining Association, to work their areas in common, postpones present competition in the field, and is to their mutual and profit.

The limited extent of the workable coals in the field county has been in some directions confirmed by workings explorations. To the north west the exploring levels of Scotia pit found the seam to deteriorate, and to be traversed by faults; on the northern upthrow the levels of the Foord pit were at a high inclination. The south levels also, 9 chains from the boundary, have got into poor ground, which probably is identical with that struck years ago in the old Stair pit workings, and also in the German's pit, and still later by the bore hole, put down by the Diamond Drill for the Acadia Company. It would seem, judging from the data furnished from actual operations, that at the time when the Pictou coals were deposited within the basin bounded north by the New Glasgow conglomerate, there was a river running much as the East River now runs, though perhaps to the south-east, which brought down much fine sediment, and deteriorated the quality of the coal beds opposite its mouth, while in other parts of the lagoon the beds less contaminated by the mud were formed of purer bituminous matter.

The Diamond Drill has bored a second hole on the Picot a depth of over 1000 feet, and a third reaching a few feet which have confirmed the correctness of the sections published by W. Logan, of the western crop of the marsh measures.

The efficiency and economy of the Diamond Drill, under skilful direction, as experienced in the operations from time to time noticed in these reports commend it highly for the purposes of the explorer and for artesian well boring.

Late trials in the coke ovens at Londonderry have shown that the coal from the Intercolonial pits will make a saleable quality of coke.

### COLLIERIES.

ACADIA.—Ten years having passed since this colliery was established, many repairs and renewals have been required in all timber structures exposed to the weather. A decade seems the extreme limit of endurance of our ordinary woods in wharves, bridges and open framings. In fact seven years of exposure is often sufficient to seriously impair their strength.

Screens varying from the common type have been put up. They first separate the largest lumps which cannot pass through bars six inches apart, and then the ordinary slack from the remainder. This double screening is most effective. The slack falls into a hopper, whence it is taken by an elevator up into a revolving screen, which thoroughly cleans the larger fragments, or nut coal from the dust and dirt or duff coal.

In the pit the ventilating furnace has been re-built with a lower arch than formerly, the approaches have been protected with brick, and the shallow upcast reduced from the unheard of dimensions, 15 feet square, to 11 feet in diameter. The ventilation has been increased by the changes, but the upcast is much too short to get the best results from a furnace which doubtless before long will be replaced by a fan.

Duff coal is now alone used, as before noticed, under the colliery boilers, and in the ventilating furnace, it is yet to be tried in the company's locomotive engine.

Sinking for a new lift has been begun, since the levels in the 4th have reached the barriers, and the work of removing pillars commenced. In the 4th lift the lowest bench of coal has been left almost intact, and should coal once more become valuable it may yet be worked and after the disturbance due to the taking away of the pillars has had time to subside. In critical situations when a "fall" was desirable to relieve the weight on the pillars, No. 2 dynamite has been used to knock out the props and set the roof working.

ALBION.—In the Deep seam the workings were confined to the winning opened by the stone drifts from the Foord pit; and merely to the fore-winning the coal by the upper and lower sets of north levels. A scale of 15,000 feet of air is now brought down through the Deep seam upper workings to this winning, and hence to the fan, hitherto it has been ventilated by a split from the main north intake. In the Main seam the level faces on both sides are stopped at faults; on the south side, three-quarters of a mile from the pit bottom, and where the seam is reduced to one-third of its thickness and yields only 5 feet of good coal. The deterioration of the seam on the south side at first showed 400 yards back from the face in the upper boards of the

lift, as the workings extended it came down and ultimate the level. Its extent already proved is considerable, and affects the prospective value of that unworked portion of the coal lying to the south-west. The coal directly to the deep is being won by an incline, and, so far as it has gone, the thickness and quality found unimpaired. The dip, however, is reduced, and at present only  $12^{\circ}$ , indicating an approach to the bottom of the level which has already been reached on the north side, first, by the incline, as previously mentioned; and secondly, by a pair of slants, after going down at the regular pitch for 150 yards, flattening to a true level so far as yet driven. Strangely enough, a fault exists directly between and in the course of the slants, and so far as it has extended itself to the intervening pillar. A bore-hole has lately been sunk through the old north slant workings and drawn-off the body of water which lay in them.

On the bank-head scales have been put up in order that the coal sold may in future be paid by weight, hitherto they have been paid by the cubic yard cut.

**INTERCOLONIAL.**—In the new lift, which gives a total level of 1,710 feet, the levels are being won out. The work is done without powder by mall and wedge, at less rates than in some other mines done with the assistance of powder.

The upper lift still supplies the bulk of the coal market. The pillars yet remain untouched. To connect with the workings on the up-throw side of the first south fault, the expense of a new level is avoided by using a back-balance.

The business of this colliery was largely aided by obtaining contracts to supply both the Steel Company of Canada and the Nova Scotia Railway with coal.

**NOVA SCOTIA.**—In June, mining at this colliery was stopped as the pumps withdrawn, and the water allowed to accumulate. The plan of the pit has been deposited in the Mines Office.

The exploring incline, mentioned in the last report, four days was run good down the barrier side, but in the level that was turned to the north, the coal deteriorated 50 yards in and before the bottom was reached. Fears being entertained that the good coal to be won would not repay the heavy expenditure necessary to open the level, fault, operations were stopped.

To relieve the intervening barrier from the pressure of water, a bore-hole has been put through from the Acadia side, the water reduced to a depth of 70 feet.

**VALE.**—The out-put from this colliery was larger than in the year before, and to further increase the facilities, sinking for a new level has begun. The present workings extend 20 chains to the east and to the west of the slope, and they are ventilated by two shafts, 1,000 c. feet each leading to the separate furnaces.



---

## CAPE BRETON.

The coal trade of this County strongly felt the great competition, and prices f. o. b. ranged from \$2 less commission down to \$1.25 a ton of round coal for contracts. The miners also suffered from scarcity of work ; and had it not been that many of them were able on idle days to fish, or to plant potatoes, and to thereby lay in a small store of provisions, they would be poorly off indeed.

### COLLIERIES.

SYDNEY.—The explosion of gas that occurred at this colliery in May, was the most disastrous accident that ever happened in Cape Breton. It will be found reported in full under the heading, Accidents.

The new hoisting shaft at Lloyd's Cove has been fitted up for drawing coals, and to the ropes are attached Walker's safety hooks, but the men still ride on the cages retained in the pumping shaft as a second means of egress. Under ground an engine has been placed for haulage, and to it will be added a Davy's Separate Condenser ; at present the planes are not in working order.

Great attention is given to the preparation of the coal. The cutters are paid for round coal only, the slack being separated and weighed by means of four Billy-fair-plays. The latest addition has been Potter's Coal-saving Apparatus, placed at the end of the screen, to save breakage. It is a tray working automatically. The weight of a given quantity of coal coming on it from the screen lifts a weight and releases a catch and allows the tray to descend to the bottom of the wagon and discharge itself ; counterbalance weights then raise it back into position, and the catch retains it there till again released.

LINGAN.—Mining has chiefly been on the south side, for to the north the coal got thin and the lift approached the crop, the surface falling off in low ground.

The pillars have been largely worked ; first, a slice has been taken off, and then they have been driven through every four yards and worked to the full. About 10,000 c. ft. of air circulate through the pit. The zeal that is displayed in getting and keeping this pit in good order, and yet practice economy suitable to the times, is worthy of commendation.

VICTORIA.—After withdrawing the pumps and allowing the water to partly rise in the mine, this colliery was sub-let to the present occupier. The General Mining Association having raised a question as to the accuracy of the pit plan, which showed the workings without the barrier, an independant survey was made and confirmed. It disclosed that the plan kept at the mine had the irregular boundary line, high-water mark so incorrectly laid down that the workings on the east side were wholly within the barrier that should have been reserved. How far the error was wilfully made is not clear, but a few years ago, on my objecting to the incompleteness of the plan kept, the present one was presented as the work of a surveyor whom I



colliery may be said to have done a fair business during the shipping season. The pit workings remain of the ordinary simple character; the ventilation being somewhat assisted by the opening of a new up-cast on rising ground. The management are fully cognizant of the wisdom of leaving an ample barrier of untouched coal next the sea boundary of the area, and it is proposed to leave a barrier of 300 feet as the denudation of the cliff is known to be rapid.

**BLOCKHOUSE.**—The large business done by this colliery was in sending gas coal to New York. The coal was taken almost altogether from pillars under dry ground, so that fracture of the surface might be attended with but a small increased discharge of water. The air circulating in the summer was found to be 18,000 c. ft. per minute.

Explorations were made at Long-beach, with a view to sinking on one of the seams of that series in the spring.

**GOWRIE.**—As at the other establishments opened about the same time, this colliery is put to large expense to renew timber structures. The superstructure of the log wharf requires to be rebuilt.

In the pit all new rooms are broken off double with a track on both sides and the centre stowed with waste, slack and stone. Off the upper west level some 17 rooms were worked; and from the inner incline, 150 yards long, some 16 places more. The foot of the incline turns towards the new pit not yet in working order. Of the 12,000 c. ft. of air that passed over the furnace, one half passed the faces of the upper levels.

**GARDENER.**—This pit was kept pumped out until May 29th when one of the boilers blew a hole in its shell. The connections being broken, steam was cut off from the steam pumps in the pit and the water was allowed to rise and drown them out.

#### AT OTHER LOCALITIES.

The pits opened have been worked on a very small scale. In Inverness County, at Chimney Corner the level in the outcrop of the most westwardly seam worked on the point has been driven about 100 feet in addition to the 450 feet previously driven. The length of the ground gives 4 small rooms. The seam is  $3\frac{1}{2}$  feet thick and drops at an angle of  $40^{\circ}$ . A small engine was set up to raise the coal from the level mouth on the wharf.

**BROAD COVE.**—The workings in the seam are merely a level in some 460 feet, an upper level and an intermediate place. The seam appears dry, with a good roof and favourable for working. The means for shipment are by scows from the river's mouth to vessels at anchor outside. To confine the river and make it available at all times of the tide a race-way has been built. Check-gates were put on it to stop the flow and flush out laden scows at low water.

**PORT HOOD.**—The destruction of the boilers early in the year prevented mining at this colliery, and they were not replaced until late in the season. The explosion of the boilers will be found elsewhere described

## GOLD MINING.

---

The character of the auriferous rocks of Nova Scotia was a subject of some scientific discussion a few years ago, and it was then suggested that the gold obtained was from "quartz beds of contemporaneous position with the quartzite, and the slate with which they are interstratified." Dr. T. Sterry Hunt reporting on this Province then wrote:—"as my present observation goes, I think that to describe the gold lodes otherwise than as interstratified beds would be to give a false notion of their geognostic relations. The laminated structure of many of the lodes, and the intercalation between their layers of thin contorted films or layers of argillite can hardly be explained in any other manner than by supposing these lodes to have been formed by successive deposition in position at what was at the time the surface of the earth."

No general description could better express the character of the leading feature of our gold districts than this; but the theory that the leads (as the lodes are locally called) are contemporaneous beds with the slates has not been generally accepted, nor has it gained ground with the additional knowledge derived from further working. It has not been adopted by any of the working men, among whom are the most skilled miners from Europe, Australia and the Pacific Coast of the Continent.

My position having enabled me to see leads in varied stages of development, I have kept in mind the opinion in question, and have carefully examined the leads in their relation to the containing rocks. The results of my imperfect observations and the opinions I have formed I now venture to give in the form of a short descriptive paper, beginning with

### THE GENERAL GEOLOGY OF THE GOLD FIELDS.

The general features of the districts and the position of the leads in relation to the country rocks may be thus briefly sketched,—the whole Atlantic seaboard of Nova Scotia from Scatarie to Sable, paleozoic rocks extend. The lines of stratification have an almost universally east and west course; and are, generally speaking, parallel with the coast line and with the axes of upheaval, north of the hill ranges, but likewise of the anticlinal folds that bring the leads to the surface. The leads also conform with almost universal persistency with the strike of the slates and quartzite beds, following even the plications of the strata with most remarkable regularity, certainly more strongly suggesting their being contemporaneous rather than intrusive veins.

While quartz veins are not confined to the districts where they are found in paying quantities, the auriferous rocks are mostly found about the axes of anticlinal folds. The appearance which they then present may best be compared to a series of diversely

sheets of paper sharply bent together, tilted at one end and cut horizontally. The lines which the sheets of various shades then show would approximately represent the position which the interbedded leads have with the slates and quartzites. And further, as on whichever side the lateral pressure found the least resistance that side would be the more highly inclined, so we find the strata of these anticlinals generally conforming to such an arrangement.

For instance at Sherbrooke and Uniacke the vertical dip is on the south side, and the angle of inclination on the north side is about  $45^{\circ}$ ; in other districts, as Waverly, Renfrew, and Moose River, the vertical and inclined dips are reversed. While at Sherbrooke the width of the main street alone intervenes between the workings on the vertical and inclined leads, at Uniacke the north dip is two miles away from the working belt. Then at Renfrew, half a mile to the south of the slightly inclined leads, such as the Preper, the free-claim leads in the overlying strata have a steep inclination in the same direction.

At Waverley the planing off of the top of the anticlinal fold has not been so thorough as in other fields, and has only been effected in that section where a valley of depression crosses the anticlinal. The top of the anticlinal fold that remains is in Laidlaw's hill, and the strata with the interbedded leads are then seen to fold over without fracture in a line with the axis—that is, in an east and west direction. While on the contrary, the elevation of the hill side is assisted by a series of north and south breaks, which raise the strata in steps of an inch or more and up to 20 feet, the smaller faults being on the crown of the hill. In this portion of the district the leads lie so flat that they are worked "longwall," and the gold is chiefly found where the lead is crumpled together by the folding and forms what are called "barrels."

In mining, the foldings have been followed down on both the north and south dips. The courses of these barrels or plications on the crest have been found to be in the direction of the anticlinal fold, and on either side to dip to the north and south, representing, as it were, the resultant of the forces encountered in the upheaval. The folds so sharp in the quartz are succeeded but by moderate undulations in the overlying stratum.

A similar folding of the leads is common in other districts, though not so regular and prominent; elsewhere the barrels are usually denominated rolls, and the angle at which they dip is various and up to  $60^{\circ}$  from the horizontal. Generally their hanging walls are alone contorted, the foot-walls seldom manifesting evidence of disturbance, though the rule is not universal.

#### THE GEOLOGICAL AGE

Of the auriferous rocks is supposed to be contemporary with that of the Cambrian, but the horizon of the belts has yet to be defined. It has been suggested that only the lowest of the series contains the gold leads as they are found, brought to the surface by the anticlinal folds. This view has been favorably regarded by those who considered the leads as bedded deposits, but the surveys hitherto made have been too fragmentary to confirm it. It may rather be considered that the

ithological characters of the several districts point to the existence of three groups of rocks in which auriferous leads are found. The lowest, composed of beds of slate and grits, crumpled and distorted, and cleaved transversely to the laminae; in these no auriferous leads have hitherto been found. The middle, of compact quartzite predominates, and the cleavage planes conformably to the lines of deposition. Rocks of this group in the neighbourhood of anticlinals are intercalated with numerous quartz veins, of which some belts only are auriferous to a profitable extent. The third group in the extreme western section of the Province, about Yarmouth, consists of olive green fissile slates, associated with beds of sandstone, and one, at least, plumbaginous bed. Some of the slates are chloritic, and in veins chlorite is common, though a rarity in the true gold districts. Mr. Selwyn, Director of the Geological Survey, states that some of the sandstones contain pebbles of quartzite, and that he is inclined to believe that these rocks are found to occupy the position of some division of the Quebec system.

Of the relative age of the gold veins that are associated with the rocks of this section, there is no doubt but that the veins are newer, for where exposed by the tide at Gegogin and Canso lead they are seen to angle across the beds and to swell into masses six and even eight feet wide, and to pinch within a few feet into less than an inch, to again expand and continue. Such veins are reported to contain a few pennyweights of gold per ton.

One vein at the Cream-pot, Cranberry Head, while not so rich as those at Gegogin is still unconformable; when worked it yielded as much as one ounce of gold to the ton of quartz crushed.

In the District of Tangier an exposure on the river side shows the difference in age between the rocks in this article distinguishing the middle and lower gold bearing. There the dark slates and bedded quartzites with the conformable interstratified gold veins are seen on both sides of the river dipping at a high angle to the south and then within a couple of hundred feet to the north crumpled. The slates are to be seen lying horizontally and cleaved transversely, and are intersected by small auriferous veins which also have the same course of the district, east and west. The reverse dip of the slates is reported to exist about a mile to the northward. The difference in character of these rocks from those of the middle group, besides color and composition, not due to the relative position of the planes of cleavage to those of deposition, is evident from the similarity in character of the rocks of the middle group in all the possible position on the crown and sides of the anticlinal fold.

In the slate rock on which the City of Halifax is built, auriferous veins of quartz carrying gold have been noticed; and apparently of the same age as those at Tangier.

#### MINING EXPERIENCE.

Mining operations are not confined to the bedded leads, but veins of paying quartz have been followed in cross leads, and what are called "angling" leads. As a rule true cross leads

age than the true leads are barren, or contain but a few pennyweights of gold. Their influence, or that rather of some so-called cross leads, on the productiveness of a regular lead is often remarked on, but cross-courses of later date are not always distinguished from contemporaneous connecting bands of quartz filling transverse fractures of the same age as the bedded leads. The effect of cross leads on the productiveness of regular leads is worthy of note. For instance, at the junction of a cross lead with the Belt lead at Montagu, some rich spots gave as high as 40 ounces to the ton. Then in the Discovery lead at Uniacke the quartz was found to be richer near the junction of what is there called a cross lead, but which in reality is an offshoot from the lead into the hanging wall, the quartz of both being homogeneous. A similar offshoot from a lead in area 629, Block II., at Carribou, marked the richest portions, and the stope, which cut the intersection, 40 feet wide and 20 fathoms deep, yielded 12,000 ounces of gold, chiefly collected about three centres on the line of the offshoot. Whether the yield of the bedded leads is in reality influenced by the position of the cross-leads may be doubted, and so of offshoots, for in many leads the number is great and a rich streak has many chances of being near one. It does not appear, however, to be a rule that the dip of the streak and the offshoot is in the same direction.

Crook's cross-lead at Lawrencetown connects two bedded leads 38 feet apart, and the richness of its contents seems to be governed by the contact of a small vein that is itself barren beyond the limits of the lead. No cross-lead is known to shift a bedded lead, though faults and breaks are numerous.

In the prescribed gold districts, besides the auriferous leads, there are other leads interbedded, which are barren. Some are known as Bull leads, often poor, compact, and containing little or no mineral matter; of unequal size and sometimes large, and as wide in places as 20 feet.

In sections where slate predominates, and there are few alternating beds of quartzite, the leads are almost invariably barren, or so sparsely spotted with gold as to be unprofitable to work.

Paying leads are generally small, of a few inches only, many will not average four inches in width, and one of eight inches is regarded as of good size. The Wellington, the largest regular lead mined, varies from ten to twenty-two inches in thickness. Sometimes a belt of small leads is sufficiently rich for a number to be worked together. On the Palmerston property at Sherbrooke, such a belt was worked eighteen feet wide, and yielded in a few months profits to the extent of \$90,000. On extending the workings to the east, where the quartz thickened and several of the branches came together, the operations proved unprofitable. Of similar character was the Hattie lead at Wine Harbor, which composed of several bands of quartz within a width of seven feet, produced some parcels which gave 15 ounces to the ton.

Within the space excavated in mining, which is seldom more than three feet, and is sometimes as narrow as seventeen inches, it is not uncommon to find two or three leads quite distinct from one another as far as the operations extend; and while one is generally relied on as the paying lead, the produce of an adjoining lead may be also sent

to the mill, although more often thrown on the scaffold and waste heaps. Perhaps the smallest bedded lead that paid to work was the Irving lead at Mooseland from only an eighth to a quarter of an inch in thickness.

Very small "angling" leads have proved rich. They are true veins, which, while having the general east and west course, break across the strike of the rocks at slight angles. In depth they gradually steal across a bed of slate from one wall to the other, but on meeting a bed of quartzite, break short across to the next bed of slate, and so on, downward. In Oldham, the angling lead, on area 533, varies from half an inch to less in thickness, the quartz generally proving richest where it passes through a quartzite bed; while other similar leads yield best in slate. The Britannia lead, one of this class, thickens in depth to eight inches, on the surface in places it is unknown. In the St. Patrick's shaft at Montagu, several small streaks of quartz run side by side in the same fashion, the main one, only half an inch in thickness, proved rich where it passed through a quartzite bed.

The regular interstratified leads often show one character, which is very suggestive of true veins, strings and off-shots of quartz extend into the walls from the leads, and are auriferous. One such string from the Wellington lead was very rich where it passed through the slate foot-wall, but barren in the succeeding band of quartzite. On the Alexandra property at Sherbrooke, an opening near a fault on the Murray lead showed a number of strings from the lead, a foot or so in length, entering the foot-wall; they proved to be rich in the few inches of slate on the wall, and a powder-keg full of sights from them gave 7 ounces of gold.

Sooner or later, in the working of the regular leads inequalities characteristic of veins are met with. Late operations at Waverley, in the east end of the Union lead, have shown the quartz to cease, while the fracture continues its regular course. The workings have also exposed a regular 'horse' of quartzite, and in one part of the foot-wall a roll of compact quartz eight feet wide, which in parts yielded handsomely. From the roll a number of strings of gold bearing quartz were found to ramify in all directions into the foot-wall of quartzite. One spot immediately below this roll gave 90 ounces from a lot of 5 tons; other strings in the foot-wall yielded largely. At a fault in this lead, drussy cavities contained crystals of quartz, galena, calcite, and iron pyrites. To mention one other instance, the West lake at Uniacke contained a pocket beneath a swell in the lead five feet wide, so rich that one crushing of 13 tons yielded 234 ounces.

In the course of working, parallel leads are sometimes noticed to 'take in' in the adjoining bed of slate, one such layer of quartz came in the hanging wall of the Wellington, at a depth of 600 feet, and from it hand-picked specimens, weighing in all 30 lbs., produced 13 ounces of gold.

In both slate and quartzite walls of leads, crevices containing little or no quartz occasionally contain gold. One flat-lying crack in the quartzite wall of a strong barren lead at Uniacke gave 3 ounces of gold, where there was only a little iron-rust and no quartz visible. Gold is also found in the slate walls of rich leads, and from some mines more slate than quartz goes to the stamp mill. In the leads it



is found associated with calcite, mica, feldspar, chlorite, with common, magnetic and arsenical pyrites, with copper pyrites, galena and zinc blende. Crystals of gold have also been found, and gold imbedded in crystals of quartz in cavities of leads.

There are yet other characters suggestive of true veins; often there is a narrow band of slate next the lead, which is called 'gouge,' on account of the ease with which it is extracted by a thin, long-pointed pick. Its fissile nature probably is due to disturbance at the time the lead was formed. Again, thin leads have been known to taper out, and what may be called their continuation to start in the side slate, and expand to the original thickness from beyond the termination of the quartz at first worked.

While many of the gold-bearing leads are regular and persistent for hundreds of feet, and lie parallel with wonderful uniformity, a careful following shows local troubles. Rolls and barrels and offshoots have been mentioned, and also their apparent influence of the productiveness of leads. Breaks and dislocations of the strata are not uncommon, and while many undoubtedly are of later age, some appear to be contemporaneous. A lead or fault divides the Sutherland lead at Sherbrooke, without shifting the strata, and on one side of it there are more bands and a greater thickness of quartz than on the other. Similarly the workings of the Plough lead at Wine Harbor have disclosed a cross fracture that can hardly be other than contemporaneous with the lead itself. Within a distance of two hundred feet the lead was found to increase from two inches in width to thirty feet at the cross fracture. Beyond the break, all efforts to find the lead proved abortive, and seemed to indicate that the strata were not displaced. Mistrusting the theory of the bedded origin of the leads, and judging the Plough lead as a true vein, I ventured, when the search for the continuation of the lead began, to dissuade the prospectors from their undertaking. The lead where it thickens is made up of a number of bands of quartz, many of which proved rich. These additional bands thin out in depth; and at a depth of less than two hundred feet the lead resumes its original thickness and is unprofitable to work. To instance the effect of a fault on another lead, one adjoining the Grapevine at Sherbrooke may be mentioned; in it the stopes were found to leave the regular slate bed and the lead to take an underlying one after cutting a small fault. Other cases have been noticed where the leads have turned into broken ground and then continued on in what appeared a different bed. The Hyde lead at Carribou, in its regular course west, flattens from 70° to 45°, continuing on in the same direction but for a short distance; but beyond where the turn of the anticlinal is supposed to be, the strata are found to dip at a high angle, and there a lead in the direct line of the Hyde is vertical and angling.

The workings of the Belt lead under a break, that shifted the lead, showed a small vein, running for the greater part parallel with the lead, much contorted as it approached the break, where it turned back and entered the lead about a couple of feet below the fault.

There is yet a structure occasionally met with in the regular leads that seems unmistakably that of a true vein. Take for example the so-called Barton lead at Tangier, which averages about six inches in thickness; at one spot in the middle of the quartz was seen a flake of

slate about an inch thick and ten feet long. It had rough edges and had evidently parted from the hanging wall, for a trail of fragments led to the site from which it had come. Where it was the lead had an apparent greater thickness than the average, but the excess was made up by difference in thickness of the slate. Other leads occasionally show a ribbon-like structure, and sometimes fragments of slate not always lying in the place of the beds, but often across it. The question how the quartz became deposited is one of separate interest, though the appearance of some leads suggests a series of expansions of the veins and successive depositions of quartz. Fine flakes of slate, detached from the wall and adhering to the quartz, mark each layer, and give it a ribbon-like structure. The rolls and barrels indicate contemporary with the infiltration of quartz, or subsequent to it, movements along the line of rupture. In a regular bedded deposit the partings between the beds are smooth and the constituents of each bed uniformly mixed. The leads of Nova Scotia show no uniformity in the yield of gold, the pay 'streak,' usually of small extent, is of varying richness. The Dewar lead at Sherbrooke, perhaps the most exceptional presents the greatest stretch of paying ground, and though other leads have been opened a like distance over 1000 feet, operations have shown alternate sections of rich and poor ground. In it the streak tends in depth to the westward, and at 500 feet the stopes have made a westing of over 150 feet. The underlying middle and Wellington leads show the same westwardly direction of the streak, and more than that, so does also the streak in each of the overlying leads that have been marked. It is further of interest to note that in each succeeding lead the paying ground is to the west of the preceding and underlying pay streak, and so regular is it that the openings on the ten or a dozen leads worked within a distance of 5000 feet, present a line parallel to the axis of the anticlinal. In other districts this character is not so well marked, or has not yet been so well developed. Instances might be mentioned of paying quartz being found only in spots, certain leads being known to the miners as nuggetty as the Blackie at Oldham. The Hay lead at Oldham was a notable example, it contained one 60-ounce nugget and no more, so far as the stopes extended. It is a lead some ten inches wide, composed largely in parts of calc-spar. At the Fifteen-mile stream, croppings of 4-ounce quartz in one or two instances raised false hopes in the hearts of prospectors. The old adage, 'Where it is there it is,' seems to apply equally well to the contents of the leads of this country as to the metallic constituents of true fissure veins elsewhere. Yet there is a probability that whatever be the length of the workable patch of the quartz or gold streak, that the streak will extend to an equal depth; and also that in flat lying leads the lateral trend of the paying quartz is more marked and uniform than in those that are vertical. On the north side of the Sherbrooke anticlinal, the lead dips at from 45° to 50°, and, as has been mentioned, the streak dips to the west; on the south side, where leads are vertical, the streak has a dip in the opposite direction. The accompanying plan of workings on the Belt lead at Montague, shows by the figures the yield in ounces per ton of the parcels of quartz extracted from the spots indicated, and consequently the irregularity in the value of the contents of the parcels separately

crushed. Had the records of other workings been as carefully kept, they would doubtless have shown the same irregularity. Nor in any mine are the workings extensive; in the Wellington the extreme depth reached was 650 feet; nor has any mine yielded very largely. The most profitable was the Ophir at Renfrew, which cleared above all expenses some £25,000.

#### RE-CAPITULATION.

The distinctive features of the gold leads of Nova Scotia are their general conformability with the slate and quartzite beds and their regularity, suggesting that they are rather beds than veins. But there are characters that point to their being true veins in spite of these features, and they are the following. The roughness of the planes of contact between quartz and slate and quartzite; the crushed state of the slate or gouge on some foot-walks; the irregularity of their mineral contents; the terminations of the leads; the effects of contemporary dislocations; and the influence of stringers and off-shoots on the richness of the leads. Characters that singly or collectively it would be difficult to account for, associated with a stratified deposit.

#### THE RELATIVE AGE OF THE LEADS TO THE GRANITE

May prove yet to be of practical importance in connection with gold-mining. On traversing the country, the hill tops are seen in places denuded of all detrital matter, save a few isolated boulders, and the junction of the granite with the sedimentary rocks is in many places exposed. At Mooseland, for instance, there are numerous exposures. In some places the line of contact between the granite and the sedimentary rocks may be seen, and tongues and veins of granite expanding into the open strata. In my own mind, I have no doubt but that the granite is an irruptive rock, and of later age than the gold leads. There is one spot on the barrens near the west shore of Moose Lake that is most suggestive, if not conclusive, of this view; a quartz lead rises somewhat above the level of the containing quartzite, and is capped by granite and also pierced by small tongues of granite. The local metamorphic effect, due to the presence of the granite, is shown in the formation of crystals of andalusite in the quartzite, just as at Cochran's Hill, Sherbrooke, garnets have been found in the slates. The crystalline structure of the granitic tongues protruding between the opened strata, seems to me to confirm the opinion that the granite is the newer of the two, for, like a chilled casting of iron, the crystals are coarse in the centre of the protrusions, when they have had a long time to form, and finer next the walls, from more rapid cooling in contact with the cold strata.

#### THE THROW OF THE LEADS.

Grooves and striae on the surface of the rocks protected from further action by a covering of earth, are common throughout the country. To account for them, glaciers, icebergs, or ice-sheets, have been suggested, and have each their advocates. The interest they

have for the gold-miner and mineral prospector, is that they mark the direction in which the surface soil has moved. Generally speaking, in a north and south course. The experience of the prospector leads him, when he finds the 'throw,' the float, or shoadstones, as he calls the detached pieces, from a lead, to seek to the north for the lead, and he generally expects to find it within 100 feet of where the throw comes to the surface, on the hang of a hill and where the cover is heavy, at a greater distance than where the surface is flat and the soil thin. In exceptional cases, where rich throw has been found, trenches have been dug for many hundreds of feet and every inch of the ground examined without discovering the lead. The so-called Rose lead at Montague is still unknown, though the throw, or drift of similar appearance and supposed to have come from but one lead, has been traced for 1000 feet. During the past summer at Caribou, large boulders of quartz, weighing in all some 40 tons, were obtained at one spot. They yielded well, and extended search was made for the lead from which they had been taken, but the exploring trenches both to the north and south failed to find it. The boulders rested on the bed-rock at a spot where it rose to a level with the surface soil, which about it was deep.

Boulders of other rocks have been traced to their sources miles away. In the neighborhood of Halifax the drift contains fragments of limestone from the Lower Carboniferous, and of amygdaloidal trap from the Triassic of the Bay of Fundy, some 60 miles distant. A lump of iron ore was found on digging a well at Hammond's Plains, of similar appearance and composition to that of the nearest known ore, that of Brookfield, 30 miles to the north.

These instances are sufficient to show that while the drift has carried much of the throw of the rocks but a short distance, it has removed some pieces to very great distances. While in general the drift is from the north, some prospectors say on some hill-tops it is from the south, indicating, if such be the case, counter currents in the shallower waters, if it is supposed that the drift was caused by a northern current and not by an ice-sheet.

The substance of these remarks has been communicated to the Geological Society of London.

---

## DISTRICTS.

---

### CARIBOU.

Rich boulders were found at the east end of the lake, which not only promised well, but yielded so largely—nearly an ounce to the ton—as to pay the expenses of extensive prospecting for the lead from whence they had come. The lead unfortunately was not discovered, though the boulders were large, indicating a wide lead or heavy roll. Forty tons of the boulders were collected and crushed, of which 7 tons gave 15 ounces. Mr. Caffrey rebuilt his mill and engine-house destroyed by fire, and resumed mining the Hyde lead. In the mill

the use of blankets was tried, but hardly so systematically as to fairly test its economy. The pumping shaft on the lead is now down to a depth of 270 feet, and the stopes worked extend 200 feet.

In the Pioneer property a shaft was put down over 100 feet on two angling leads that have a slight inclination to the east; they are about 5 feet apart, and 2 inches and 7 inches thick. In the slate, the length of the shaft, 8 feet, the leads gave from one to two ounces, but in the quartzite they proved poor.

On area 424, a lead 3 inches thick gave some returns of 2 ounces, the stope taken down was 35 feet long.

The rest of the prospecting in this district by Mr. Tonquoy and others, did not result in finding ground profitable to work.

#### MOOSE RIVER.

This new locality has been a good deal prospected, but without any marked result so far. It has drawbacks in being more out of the way, wetter, and with more surface covering the bed-rock than many other districts.

On area 174, a double lead of 2 inches and 5 inches was exposed; it was traced on to area 172, where for a time it gave over one ounce to the ton, and also beyond to area 126, where it thickened but did not maintain its yield of gold. Exploration trenches in its neighborhood, extending 300 feet and averaging 10 feet deep, failed to find more than three small and poor leads.

An attempt was made to wash the surface, which at first, at any-rate, was not very satisfactory. For the purpose a race about half a mile long was made, and two flumes, each about 200 feet long, were built. The sluice in which the washing was done was over 300 feet long, but had not the fall that was desirable to clear itself. The returns show the quantity of gold thus obtained.

Other prospecting south of the Comstock lead uncovered a lead which was 7 inches wide and promised fairly with a yield of 17 dwts., which, if maintained, will pay.

#### FIFTEEN-MILE STREAM.

A large party of miners again tried the Jackson lead and prospected for others. At times they were encouraged, but not sufficiently to induce them to remain after a trial of many weeks. Two leads that they opened gave 4 ounces on top and but little or nothing at the next crushing. Messrs. Hall still have faith in this district, and believe that they have exposed a lead or two from which the rich boulders, that have drawn prospectors to this district, have come.

#### GAY'S RIVER.

The workings on area 3 have been continued, and the incline drift along the bed-rock extends 200 feet; the lateral workings extend into the runs about 60 feet. Little of the conglomerate is taken, chiefly the top slate, and care is taken to follow the open backs, which are filled with clay and often contain pockets of gold.

Other openings were made adjoining Mr. McClure's property, but no profitable runs in the slate or overlying conglomerate were struck.

#### LAWRENCETOWN.

The promises which the discovery on area 280, mentioned last year, held out, were not realized, and the little work done in this district was in prospecting and proving the extension of the discovery referred to. Mr. Crook opened on the east side of the river the main lead, which on the west side is intersected by his well-known cross lead. It is 4 to 6 inches thick, but was not found to contain much gold. The cross lead was worked to a depth of 47 feet. It really is a connecting band of quartz crossing the metals from another bedded lead 38 feet to the north. Looking south, it is broken by faults, which shift it to the east, in which direction it has an inclination. The rolls in it are nearly vertical. It yielded well when the rolls were cut by a fender on the foot wall, but neither alone were rich.

At Chezzetcook in the Spring, strong interest was taken in some leads, which, on being worked, failed to justify the hopes of the explorers.

#### MONTAGU.

As is so often the case with tributers who take an abandoned mine, fit it up and pump it out at considerable expense, the tributers who re-opened the cross lead got barely more than a color of gold for their time and money.

Nor were those who took the Lawson Mine or Albion mine on the Belt lead much more fortunate, though their first crushing from the West bottom stope did give about 2 ounces to the ton. In their explorations they drove a tunnel west at a depth of 80 feet into the Symonds property; and also they sought for the intersection of the angling lead, which cuts the Belt lead, with the parallel Iron lead 12 feet north, hoping to find a rich pocket, as was found at the intersection of the Belt lead, just above where they tried. This angling or cross lead in its downward course breaks straight across a thin bed, but gradually inclines to the north in slate. Work on the eastern end of the sett on the Belt lead was continued at a depth of 200 feet, and a stope of 30 feet taken down 40 feet, but the lead there is thin. An exploring tunnel was also driven east, just below the intersection of the angling lead.

At Bendigo some mining was done on Mr. DeWolf's thick lead to a depth of 80 feet, and a great deal of prospecting for the source of large boulders that gave in some instances over one ounce to the ton, but without success. Other areas and places in the neighborhood were tried, but nothing of value found; for instance, on the Preston road, near Furguson's, on a lead which, being in a slate belt, was hardly to be expected to be worth working.

## WAVERLEY.

Mining on the Union lead, area 169, was abandoned in March, it having been for some time unprofitable. The stopes had been taken down to a depth of — feet in the pumping shaft, and they extended — feet on the lead.

The north Tudor or Brodie lead was then opened, area 133. On the surface it was 10 inches thick, but reduced to 7 inches at 60 feet down. It dips north and has been mined to a depth of 140 feet. On the foot-wall the gouge, bulk, or crushed slate assists the mining as good holding, in a seam does coal cutting.

Further prospecting by Mr. McClure on American Hill discloses nothing of value. Mr. Huff found on area 185, in a bed of slate 12 feet wide, seven leads, which gave a total thickness of 56 inches of quartz. On area 189 he struck rich quartz 6 inches wide, but which on either side, within a distance of eight feet, thinned down to one inch and a half inch thick, and at a depth of 5 feet disappeared. On Laidlaw's Hill three parties of tributers worked on the edge of the northerly dip, and in the early part of the year struck some rich barrels.

## OLDHAM.

Mr. Baker continued to work his rich lead with large profit during the first half of the year, and the three shafts taking down a stope of 60 feet, reached a depth of 200 feet. The lead is very irregular and ill-defined; in places completely cut out, for instance, at the intersection of angling leads, which appear thrown by the lead 4 to 8 feet and to be reversely faulted. The lead is also pinched in a vertical direction, and between the middle and the north shafts there is a block of ground 30 feet wide. The lead is itself faulted, and off-shoots go off from it into the hanging wall.

In connection with the excellent engine for pumping the mine, a mill of eight stamps was attached.

A lead still further east, on area 143 (?), yielded well to a depth of 30 feet.

Another rich spot was struck on the Britannia lead, an angling lead that often has been found to thicken in depth to 10 inches, and yield well.

The rest of the work in the district was chiefly on the surface or in spots of leads left in previous workings, and altogether of no great extent.

## RENFREW.

The extensive prospecting and further trials of already discovered leads in this district have not met with marked success. Work on the McLeod was stopped as the lead became poorer and thinner in depth, on area 369, and when the pumping shaft was down 120 feet, the second 100 feet west 70 feet, with east stopes extending 50 feet beyond the shaft. The same lead was tried 750 feet west, with no better success.

Later in the year the Hay lead was worked with some prospect of its paying expenses.

## SHERBROOKE.

This important district, though it maintains its leading position, fell short in its yield of that of the previous year.

The veteran Wellington mine was again closed. In it the stopes extended at the bottom 300 feet west of the shaft, and 180 feet below the shaft bottom, 500 feet down. The accompanying Dewar lead continued to pay for working, especially in the westwardly course of the gold streak; its deepest shaft has attained a depth of 480 feet. The intervening Middle lead has developed most satisfactorily, and already 240 feet of stopes are open, partly to a depth of 120 feet. The shafts on this lead are well fitted up.

The Blue lead was re-opened on area 615; the original workings had been taken down 300 feet, and stopes extended west 125 feet. The lead is in parts 10 inches thick. The workings in the overlying big lead in the same area have about the same depth and extent.

On the adjoining area, 614, Mr. Zwickel mined the Middle lead, which though thin, continued rich down to the depth worked—200 feet. The continuation of this lead on the adjoining area, 613, the Gladstone Company had opened to a depth of 180 feet. The McClure lead, which overlies the Middle lead, was found to carry the gold irregularly. An underlying thick lead was also opened.

On the Hayden and Derby property, the Harrison lead was re-opened to test whether the gold streak was really cut off by the break which was made the western limit of the first operations, which reached a depth of 280 feet. The result is unknown.

On the southern side of the district little important mining was done; tributers chiefly sought for blocks left unwrought that were supposed might be worth taking out.

At Goldenville an additional water mill has been built by Mr. Hattie.

On Cochran's Hill several leads were tried that gave good returns on the surface. On going down on them they were found irregular in thickness and in yield. Some thinned out completely. The presence of garnets in the slate of this district indicate extreme metamorphic action. At the end of this district—at the Crow's Nest—leads opened yielded but a pennyweight or two of gold.

## STORMONT.

The one lead mined on area 4 yielded fairly in the winter, but owing to troubles among the owners, working ceased until late in the autumn. At Country Harbor Narrows, in this district, some quartz was got out, which, however, yielded but a poor return.

## TANGIER.

At Mooseland little was done; some prospecting and a few crushings taken from eastern end of the Furnace and Irving leads.

At Tangier, mining on the working lead traversing the ground, from whence the washings had been taken, was stopped, after opening 250 feet on the lead, at a heavy fault. In the best part of the lead a 90 feet stope was taken to a depth of 92 feet.



Then a lead in the same strike further west was opened by three shafts to a depth of about 40 feet. It is troubled, and splits up as it nears a large fault. Tributers worked it at 35 cents a superficial foot on the lead, timber being found them. Opposite these openings, on the south side of the road, the supposed extension of the Niger lead was opened, where it promised to yield well.

The true Niger lead was re-opened from the old tunnel by a winze down 35 feet to the west of the tunnel; a 60 feet stope worked the lead to a break. It is from 6 to 12 inches thick, and in parts yielded well.

The well-known large Leary lead was re-opened for 800 feet, by two sets of tributers, at a 6 p. c. rental. The summer being dry, a large quantity of quartz was cheaply mined, and a fair yield obtained. The stopes were taken from above the 20 feet horn level to the east. To the west of the pumping shaft a tunnel goes in some 200 feet, making the total length of stopes about 1000 feet.

From Ecum Secum some quartz was brought to the Tangier mill, which contained a paying percentage of gold.

#### UNIACKE.

Operations on area 614 were again entirely abandoned. The most successful mining was on area 717 (?), by Mr. McIntosh, which he worked for nine months after the small lead on the Toronto property, which paid him well the year before, failed. This new lead varied from 3 to 8 inches in thickness, and yielded a good return on a narrow stope to a depth of 70 feet. The streak dipped to the east between a deflection of the lead and a feeder on the north wall, dipping at an angle about 45°.

On the Montreal property a lead was found in the autumn, which yielded fairly; it was worked by two sets of tributers.

Other ground was broken on the Queen and Prince of Wales properties, but no permanent works established.

#### WINE HARBOR.

The Plough lead was partly pumped to enable tributers to get at the overhanging bluff, left on the first working of the lead, and the crushings of the quartz obtained left a small margin for the tributers. Those engaged on the Mitchell lead did better, and they took down a stope of 120 feet in part, 20 feet below the tunnel level, or 100 feet from the surface. There was also some prospecting on the Barrens, but this district as a whole fared badly.

---

### ACCIDENTS.

The array of casualties for the present year is more serious than any since 1873. Of the accidents reported, seven occasioned the death of thirteen persons. The most calamitous being an explosion of gas at Sydney Mines, killing six, and an explosion of a boiler at Port

Hood, fatally injuring two men. Besides the accidents that terminated fatally, several so seriously injured the victims of the accidents that they were maimed for life.

The direct cause of the more serious fatalities will be found mentioned below. The indirect causes of some others are not difficult to surmise, either in laxity of discipline, inferiority of material or carelessness of individuals.

Closely connected with this matter is the punishment of persons for breaking the mining laws. Several cases came up during the year before local magistrates, and fines were inflicted for smoking in a place where safety lamps were used, for leaving a ventilating door open, and for entering fenced places. One case that came before the Stipendiary of New Glasgow was thrown out of Court, on the ground that the men who, in that particular case before him, entered a pit without leave, and went where they had no business to go, were strangers, and not workmen, and therefore did not come within the meaning of the Act.

#### FATAL ACCIDENTS.

1. January 14th—James Chevall,—By a fall of frozen ore in a surface heap at Londonderry.
2. February 15th—Alexander Watts, aged 56, married; and Angus Gillies, unmarried,—By an explosion of steam boilers.
3. May 21st—Isaac Greenwell, Manager, aged 58, leaving a family grown up; William Oram, Overman, aged 50, leaving a wife and five young children; Murdoch McDonald, aged 60; Roderick McNeil, aged 62; Robert Hutcheson, aged 22, single; and Edward Millville, aged 20,—All by an explosion of gas at Sydney Mines.
4. May 23rd—Francis Colin, aged 15,—Run over by a pit tub at Acadia.
5. May 23rd—Guthrie Holland, single,—By a fall of roof stone, Albion Mines.
6. September 16th—William H. Strong,—Run over by a locomotive engine, Spring Hill.
7. November 8th—John Penrose,—A fall of ore from a stope at Londonderry.

#### EXPLOSIONS OF GAS.

Four were reported—three at Sydney Mines and one at the Acadia.

The dire explosion at the Drummond pits in 1873 aroused the coal miners of Pictou County to a sense of the risk ran in working in fancied security from explosions of gas, in overlooking any precaution, or in relaxing a strict discipline. The same wholesome dread of the miner's subtle enemy, fire-damp, did not impress itself to the same extent on the workers in Cape Breton, where an evident though unexpressed feeling animated the miners that similar care and discipline were not so requisite. But a severe lesson has since been taught them, and in a mine where the management gave great confidence to those engaged.

During the past winter the work of opening out the levels and deeps from the Lloyd's Cove pits at Sydney, was pressed on with a consequent lengthening of the air courses. For ventilation from 18 to 20,000 cubic feet of air per minute were circulated, and with care conducted past the working faces. Yet some slight explosions occurring in the spring of the year showed the need of extra caution to meet the increased exudation of gas in this winning. At the face of the level from the S. E. deep, gas was noticed, and in March a man was slightly burned within an hour or two after his place was examined in the morning. Again in April another man was burnt by gas through leaving his place, a headway, and entering an adjoining one that was standing and fenced off until his was up and holed through. A third accident occurred at the same place a week later when the cross-cut was through. It was directly due to the fall from a shot choking the face and temporarily checking the ventilation round the end of the brattice. These small explosions occasioned a correspondence, in which stress was laid on the General Rules bearing on the subject of sufficient ventilation, the thorough examination of working places, and the enforcement of discipline. The first suggesting an insufficiency of air, though the brattice was conducted near to the face, and the second the advisability of enforcing discipline, for the man McPhee, without authority, entered a place not his own, and one which though bratticed was guarded by a danger board. The agent was advised that McPhee should be prosecuted, as an example, to ensure discipline, and to show that he intended to be guided by the spirit as well as the letter of the mining law.

The circumstances that so shortly after led to disaster might not singly have resulted in accident, but happening together, occasioned one hitherto unequalled in the annals of coal mining in Cape Breton. They further show how difficult it is to get men to implicitly obey instructions, though written out for them and even impressed upon them, especially when the instructions and their practice are nearly identical. Immediately after my correspondence, the general and special rules were read over to the deputies, and strict attention was enjoined on the management by the agent, yet as the following account demonstrates, the rules in some cases were not strictly carried out.

On the morning of Tuesday, May 21st, a blast of air and dust up the unfinished winding shaft intimated only too plainly that some serious explosion had occurred in the workings. The agent, with some volunteers, immediately hastened below to render assistance to the imprisoned men, and supervise the work of restoring the ventilation in the absence of the under manager and overman, who were among the missing. It was at once evident that the explosion was confined to the north side; no damage was done on the south side, even some men continued to work unconscious of the accident. In the mean time, the deputies at the pit bottom organized an exploring party and assisted in the escape of the men from the rise workings. These were much affected by the vitiated air through which they had to pass, the explosion having destroyed the doors and stoppings on that side. Their escape reduced the number to be accounted for to twenty men, and indicated the deeps as the scene of the explosion;

there the explorers set to work to restore the air courses and rescue any men still alive.

To explain the position and cause of the explosion more effectually, it may be well here to describe the district. Near the pit bottom an engine plane starts to the deep in a northerly direction, and at a short distance branches off to the S. E., both planes to win the coal lying seaward of Cranberry Head.

The S. E. deeps had been put down 1000 feet, and from them a pair of levels were driven southwardly to a distance of two chains, beyond a cross-cut that cut the faces of a few parallel rooms to the rise of the levels. Work in these deeps had been standing for a couple of months, but it was to be shortly resumed. From the N. deeps, levels and rooms were being worked in the opposite direction, and they were much further advanced than those to the south. It was fortunate that they were so, or the loss of life that resulted undoubtedly would have been greater.

When the volunteers had carried the air in as far as the upper room of the N. deep workings, they saw at the face the naked lights of men, who had been prevented from escaping by the after-damp that lay between them and the shaft bottom. One man, R. Hutcheson, lost his life in attempting to get through it. On the approach of the exploring party, these men rushed through the bad air, some unaffected by it, while others dropped under its deadly influence and were with difficulty rescued. To mention the names of those who especially distinguished themselves in the work of rescue, would be invidious, for several devoted themselves to the imminent hazard of their own lives. The explorers then turned their attention to the recovery of the bodies of the lost, six in number. Edward Melville, a driver, was found in a cross-cut, where he had made his way after the explosion, and was overcome by the after-damp. The road men, M. McDonald and R. McNeil, where they had been working on the plane-way, and the under manager, with the overman, in the upper level of the S. E. deeps.

It appears from the evidence adduced at the inquest, that the explosion was brought about in consequence—1st, of the ventilation of the S. E. deep levels having been destroyed for nine days; 2nd, in the under manager and overman having entered places, not working places, and as such daily subject to examination, with naked lights; and 3rd, in the danger-board, required by the Special Rules, having been so placed that it did not prevent persons from inadvertently entering without passing it—a place daily examined.

The evidence of the deputy, George Ray, was to the effect that on the previous Sunday but one, a canvas door was required for some place on the south side, and that the under manager gave permission for the removal of one which turned the air going down the S. E. deeps into the levels; at the same time he ordered, it was said, the danger-board to be put in the upper level. His sanctioning the removal of the door was corroborated, but there was no evidence to show that he had ordered the replacing of the door, which, for a man so generally careful, it is probable he thought he had done, even if he failed to give the order, and knowing as he did that at the face of the level a man had been slightly burnt in March. His ordering the

danger-board to be put in an improper position did not altogether exonerate the deputy from his share of responsibility, unless the deputy had first protested against the selected position. I mention this for the advice of deputies generally.

On the Tuesday morning the under manager and the overman together entered these deeps to arrange about re-working them. They carried naked lights, which is incomprehensible in the face of the General Rules 2 and 4, and the Special Rule, *Deputies*, 7; though it is possible that the under manager did, or intended to, try all suspicious places with his candle, for he prided himself on the steadiness of his hand, and he alone carried a candle. They reached the upper level, at least within a chain of the face, and then, whether they unexpectedly fired the gas, or whether they had detected its presence and had turned to retreat, can never be known. But the lamp of Oram being found just inbye of Greenwell, and their usual practice when travelling being for Oram to be some paces in the rear, would suggest that Oram had been where his lamp was found, that he had dropped it when the gas fired and ran back. This is presumably confirmed by the finding of his body, some 20 (?) feet back, on the low side, between the props and the wall, and more burnt than that of the under manager, who dropped, with his face covered, in the road-way.

Where they fell, the coal was not coked or the props disturbed, but in the lower level the evidence of intense heat and great violence were manifest; on the high side the coal was coked, and the props that were not knocked down were charred on the inbye side for a distance of 150 yards. The blast swept with violence up the deeps and burst through a cross-cut into the north deeps, where the road-man, M. McDonald, was working; the blast split at the cross-cut, the major part taking the direct return to the rise, and part going down the north deeps, overpowering the other road-man, R. McNeil, on its way. In the level below, a door was overturned on a trapper-boy, who was also slightly burnt, but who was rescued. McDonald was crushed by the fall from the roof, and also somewhat burnt. All the other sufferers, the doctors affirmed, fell from the after-damp, and in no case died from injuries.

When it is remembered that the levels from the S. E. deeps were in only two chains beyond a cross-cut to the rise, and were connected by one within two yards of their faces, the position is not one where it would be generally suspected much gas would lay, and possibly gave undue confidence to the management. The workings of the new winning are dry, and the road-ways are deep in dust, which a blast undoubtedly would raise in clouds, and, mixing with the air, add fuel to the flame.

The agent, Mr. Brown, in his evidence, stated that "he had every confidence in the ability and experience of Mr. Greenwell; that the ventilation was entirely left to him to regulate, subject to his approval; that Mr. Greenwell had full charge of the pit for more than 13 years; and that he knew of no complaints having been made of bad air." It was also stated that the men had entire confidence in him.

On the 3rd June, a slight explosion took place at the face of a plane-way which was being driven in the Acadia pit. The place was examined only two hours before, when the shift started, and when

there was no gas. It is supposed that a small feeder was cut, and that the gas accumulated while the men were cutting up the bench for the brattice. J. W. Sutherland was so much burnt that he was off work for three weeks; W. Wilson was only slightly burnt.

#### BOILER EXPLOSIONS.

In last year's report the matter of boiler explosions was gone into at some length, the more common causes were mentioned, and the beneficial results of boiler insurance dwelt on. A disastrous explosion was referred to in detail, and in a foot note mention was made of another that occurred early in the year now under review; subsequently two other explosions happened at collieries, one of which was attended by fatal results. The cause of each is not difficult to surmise, and will be suggested as each case is mentioned. They all demonstrate the folly of that economy, so called, which asks for cheap material, put together by ordinary workmen, and improperly or incompletely fitted, and does not employ competent persons to periodically examine the condition of so dangerously powerful a servant for good or ill as a steam boiler.

January 9th.—At 10 P. M., one of the set of seven boilers at the Victoria Colliery, Cape Breton, exploded and severely injured a young man, Stephen Livingstone. A foot-note on page 10 of last year's report mentioned this occurrence, and referred to a demand that had previously been made, that the manager should comply with the mining rules respecting boilers. This demand, though promised six months before, it then appeared had not been complied with, and proceedings were about to be taken against him, when it was found he had resigned his office. The neglect was so gross, that had the young man died and a coroner's jury been made acquainted with the facts, a verdict of manslaughter against the manager would probably have been rendered. The following extract from a letter, dated June 18th, 1877, will explain the condition of affairs previous to the explosion:—  
*"Sir: I regretted not seeing you when at the mines on the 11th inst., for I desired to speak to you of matters I was sorry to find untended to. I had hoped that my letters to you in 1875 had made clear to you our mutual positions in relation to the Mining Law. And on reviewing my correspondence and conversations, I hardly knew how to impress upon you the necessity that you, as an agent of a mine, must comply with the requirements of the Mines' Regulation Chapter. I cannot believe you intend to set the law at defiance, and therefore write to you once more, trusting that you will relieve me from bringing an action, by at once making yourself familiar with the law and complying with its regulations. After the passing of the Act, I drew your attention to it, and pointed out the General Rules, &c. When I next saw you, and found the Act ignored, you promised a ready compliance. I then spoke of a matter or two that required to be remedied, and dwelt on your having a proper plan, and a copy of the abstract of the Act kept posted in a conspicuous place; subjects that had again to be spoken of. Subsequently I wrote authoritatively of such cases of non-compliance as I had*

"noticed, (among them 'a proper safety-valve'); and also explained that I am neither required to point out every neglect, nor that you are excused by any oversight of mine.

"You and not I are responsible for non-compliance with the law. Last year I trusted in some points to your compliance, and overlooked visiting your engine-house and boilers. This year my astonishment was great when, after all I had said on the subject, I found but the one safety-valve, and it overloaded, and the exposed boilers still covered with cinders, against which I protested. \* \* \* General Rule 24, requires a water gauge and safety-valve for *each* boiler. One steam gauge for each *set* is permitted by general agreement, before the Commissioner and Committee of the House. \* \* Any connivance on my part at neglect would be culpable, and I must have, with all reasonable despatch, a safety-valve placed on *each* boiler." \* \* \*

A correspondence ensued, which resulted on the 18th August in the agent writing:—"I have to advise that the Company have ordered a safety-valve for each of the boilers in use, and that they will be placed in position as soon as they come to hand." The same letter went on to state that, "The following is an extract from a letter of Adam McKay, Esq., the maker of the boilers, dated Halifax, 3rd August, inst.:—'Regarding the pressure you could with safety carry on the boilers, I beg to inform you that, when new, they should stand, according to present Dominion law, a pressure of 128.5 pounds, working pressure, and were then tested to 150 pounds. You may therefore govern yourselves according to this standard, making a reasonable allowance for depreciation, dependent upon the care which has been taken of the boilers.'"

NOTE.—The Dominion law allows the extreme working pressure to be two thirds of the test in the case of marine boilers, so that a test of 15 lbs. would allow a working pressure of 100 lbs. not 128.5 lbs. The Hartford Boiler Insurance Company allow only one half the test which would be only 75 lbs.

Upon receipt of such an assurance I took no further steps, and was surprised to find out after the explosion that although the valves were obtained at the time stated they had never been put on, and that the one valve on the main steam pipe was retained with additional weight on the lever to prevent the loss of steam. When two years before I required "a proper safety valve." One new one had been procured and allowed to get into an equally disgraceful state with the one replaced. When last on the ground previous to the explosion I enquired how often the boilers were internally examined, and the man in charge of the machinery distinctly told me that he himself went into one of them about once a month, thus giving to each boiler an internal inspection semi-annually. Such unusual attention surprised and impressed his statement upon me. I was less surprised to find the firemen and others who had been about the place for years afterwards say that to their knowledge not more than four internal entries had been made altogether, and that in the whole set of seven, during four years when, after the explosion, an examination was made of the

remaining six, some of the stay-rods to the ends in all were found broken; the fractures all appearing to be old; and on removing the scales from the interior of one a hole was made through the shell by the hammer.

Immediately after the explosion Mr. Rumble, of Lorway, a mechanical engineer of very great experience made a thorough examination and kindly gave the following information.

"I examined the boiler which had exploded and now lies 115 yards from its original seating, the furnace end blew out in the opposite direction and carried with it, the pump-tender, Livingston, fully 200 feet. The boiler had originally five stays to each end; the middle of  $1\frac{1}{2}$  in. round iron, and three of the four 8 inches from the circumference of the end had evidently been broken for some time; for while the laminations in the fractured plate had fresh edges, the end of the stay rods were black and rusted. The sound stay still held a portion of the boiler end, the vent having followed round the flange with this exception. There was no bulge over the fire or appearance of overheating. The boiler is 30 feet long, 3 feet in diameter and of  $\frac{3}{8}$  in. plate apparently of good quality. I examined the one safety valve which had been on the main steam pipe, it was closed and could not be moved by my hand for the spindle was corroded and caused much friction in opening. A calculation made the pressure load on the boiler when the weight was at the end of the lever, 80.26 lbs. Of late the weight had been placed 5 in. from the end, which would reduce the pressure to 75 lbs. supposing the valve to be in order; but previous to that additional weight had been put on the lever, and the pressure unknown. The steam gauge registers to 100 lbs. and is placed in the engine house, a defective and useless steam gauge is immediately in front of it. To enable the fireman to see the gauge, a hole is in the wall of the engine house, so placed as to enable him to see over the defective gauge from the outside. (In my correspondence of the preceding year, when trying to rouse those in charge from the slough into which they had fallen, I went so far as to write:—'Your steam gauge is awkwardly placed behind another whose presence would be a disgrace to most engine-houses and engineers'—but without effect.)

"The globe-valve connecting the boiler with the main steam pipe was torn away by the explosion from its connections. I very carefully examined this valve, and found it blown out of its seating, and obstructing the passage from the boiler to the steam-pipe; to this, together with the broken stays, may be attributed the explosion. Had there been safety-valves fitted, this accident would not have happened.

"These boilers are under any circumstances over pressed for the thickness of plate. No gauge glasses were in or upon any of the boilers when the accident took place. I examined the gauge glass fittings and found them choked up with packing and dirt, showing the correctness of the fireman's testimony. When boilers are exposed to the weather, without a boiler-house, it is almost impossible to prevent the gauge glasses from breaking.

"Both the day and night firemen were on the ground with Livingstone, who was up from the pumps to eat his supper. Their evidence was to the effect that all the boilers had been fed with water within the hour, and that if any one was short it would have been one at the



other end of the set, first pumped up; that within the half hour, the water had stood at the second of the three guage-cocks in the boiler that exploded; and that the safety-valve was blowing off. They had never known the gauge to register more than 75 lbs.

"My opinion is, that the globe-valve blew out of its seat, and contracted the orifice so much that the steam could not pass from the boiler as fast as it was generated, and the accumulated pressure burst the boiler; observing also that the boiler was already weakened by the stays being broken.

"One thing I would call your attention to in the construction of globe-valves such as this one, with cast iron chests and brass valves, how small are the surfaces for friction, although parallel, to keep them in their places. To keep the valves down they should have a flange and a few small bolts. The least carelessness in the men fitting in the valve, leaving it a little too slack, will do all the damage. As a practical engineer, I know these things do happen, and I have always regarded safety first, economy second; and in safety I have always experienced economy."

This report of Mr. Rumble leaves little room for doubt but that gross mismanagement led to the explosion. The manager, from want of technical knowledge, seems to have been unable to distinguish between true economy that he desired to practice, and the appearance of it, which sloth and neglect produce. The extracts from my correspondence I give as an illustration of my remarks of last year, page 6—7, respecting the practice of "impressing the advisability of strict compliance, and if need be, 'with all the insolence of office,' " rather than by appealing to the law, the more public method. A change in management in this case alone prevented an action being brought, for the owners were not liable since they authorized compliance by the manager. But it is to be hoped that this statement, publicly made, will have a beneficial and deterring effect on those inclined to overlook the wise requirement of our mining law, equal to that which an action at law would have.

March 8th.—A much more disastrous explosion of a steam boiler occurred at Port Hood. Three weeks before the house over the engine and boilers had been destroyed by fire, but as the walls had been pulled outwards at the time and no burning material allowed to rest upon the machinery, no damage was supposed to have been done. The boilers remained half full of water after the fire was out. There were two, 30 feet long, 30 inches in diameter and of  $\frac{1}{4}$  inch plate. They were made at New Glasgow and had been set up two years, but little used, and showed no signs of corrosion. An external examination showed no signs of injury though it was thought that a leak in the top of the north boiler was worse a little than before. A machinist was at the time of the fire down from Halifax and he thought the leak would take up. Steam was got up and the boiler used. On finding that the leak did not take up, it was caulked one evening, the next morning the boiler exploded and immediately afterwards the second boiler blew up.

The explosion overturned the engine house which had been rebuilt and one of the two men inside it at the time was so severely injured

that he died within a few hours. The other man escaped unhurt. The engine man who was firing at the time was scalded, and died from the effects in a few days. Some three other men were shingling the engine house and the manager stood by when the accident occurred. They all escaped.

At the inquest, which was immediately held, it was not thought necessary to call the inspector. When later I saw the remains of the boilers it was impossible to say whether the fractures were all fresh or in part old. In both cases the fractures followed closely the line of rivets of the third ring from the back end, and the nearest point to the suspending rod. In the north boiler the crack followed the line of rivets all but for some six inches. In the south or second boiler to explode the rent followed the rivets for about two thirds of the circumference. The pressure of steam was said to have been 52 lbs, the boilers having been tested to 125 lbs.

The two pieces into which the north boiler was divided were thrown 150 feet apart; those of the second to nearly 500 feet rising in their flight to greater heights than those of the north boiler, the large piece for 80 feet of its course mowing down a grove of spruce. The indents in it caused from striking obstacles in its flight were all cracked, and one hole made through had several radiating rents with little bending of the plate, leading one to suppose that the quality of the iron was inferior.

As no internal examination of the boilers was made after the fire it is impossible to say whether the rents between the rivets were already started, but it is presumeable that it was, and that the caulking of the leak increased the strain. The marks of the caulking iron are very plain. That the rent started from the upper side where the leak was is probable because the ends in their flight had a low trajectory and were propelled a comparatively short distance; differing from the case of the second boiler, the ends of which flew high in the air and to a greater distance. The cause of the explosion of the second probably was due to the explosion of the first lifting its back end from the seat and also knocking away the supports of the two baulks on which both boilers were hung and allowing it to fall back unsupported in the centre. The strain to which such a boiler, only 30 inches in diameter and 30 feet long, when three-fifths full of water, would then be subjected would cause it to give way, even were the quality of the iron superior.

May 29th.—The third explosion during the year occurred at the Gardener Colliery. The water used was partly from the pit, and was corrosive in its action. Of the set of four, two were laid off and undergoing repair. The workmen had left but half an hour, when a hole blew out in the side of one of the two in use. The explosion disturbed the boiler in its seat, broke the connections and knocked out the fronts. The cause was apparent enough. The boiler had been repaired eight months before, a half plate put on over the fire and this plate had corroded about the water line until in part it was reduced to 1-50th of an inch in thickness. The hole made was about 15 in. by 10 inches. The plate used for the repairs of the previous autumn was taken from the boiler that exploded at Langan in the previous spring.

---

**EXPLOSION OF POWDER.**

In February, a miner in the Vale pit approached a shot that hung fire, and as he did so, it went off and cut him severely in the face and hands. This is the only reported case of an explosion of powder causing injury to a miner.

**FALLS OF COAL, ORE, AND STONE.**

In this, the largest class of accidents, three fatal occurred. The first in January, at Londonderry, from the fall of a frozen mass of ore in a surface heap, at which James Cheville was engaged in filling cars.

The second accident happened in the Foord pit, from a fall of stone from the roof, between the first set of timbers and the face of the board. The piece that fell on Guthrie Holland was about 3 feet by 2 feet and 4 inches thick. The rock about was quite sound.

The other fatal accident was at Londonderry, from a fall of ore in the stope above the shallow level. The last report mentioned two accidents as having occurred during the previous year from the same cause. They happily were not fatal.

Eight other accidents belonging to this class were sufficiently serious in their character to be reported. They caused injury to ten men, and from inquiries made, they were mostly due to want of judgment and care on the part of the men themselves, either in taking down a fall that hung after a shot, or in neglecting to sprag a holing.

**MISCELLANEOUS CASUALTIES.**

Ten other accidents were reported, two of which resulted fatally. The first at the Acadia pit in May. Francis Collin attempted to get on a rake of tubs in motion, and slipped, the rake passed over one of his legs and crushed it. It was amputated at the time, but he died three weeks later. The other was a very painful accident. Strong was a brakeman on the Spring Hill Colliery branch road, and while the train was in motion he attempted to step upon the tender; his foot slipped and caught in frog of a turnout, and before he could extricate it his leg was torn off at the knee joint.\*

Of the non-fatal, four were in connection with machinery, either while working about engines in motion or gear driven by engines. An "incline boy" named McKenzie changed duties with another, and while riding up on a back-balance, fell off, and was caught by the descending counter-balance, which crushed him severely, and seriously threatened his life. A man while engaged banking coal tipped his tub too far, and falling over with it, received severe injuries. Another man, while attempting to cross a room in the Victoria pit while the coal was running down to the shoot, got his leg crushed by the coal

---

\*Another very distressing accident occurred at the same colliery late in the year. A son of the Manager caught his hand in the revolving screen, which drew in his arm and crushed it to the shoulder. It was amputated, and although the shock was severe, hopes are entertained of his recovery.

and injured. Another accident which happened at the last mentioned colliery, shows how necessary it is as far as possible to fence in platforms and exposed places. The night bottomer on coming up, stepped over the edge of the platform, and fell on the boarding at the slope top.

#### RELIEF FOR THE WOUNDED.

The above record but badly infers that great suffering was entailed by accidents about our mines during the year. To entirely prevent accidents is impossible. To be prepared for their occurrence, which amounts almost to a certainty, becomes a duty. Medical men are promptly on hand about large establishments, ready to succor the injured; but still much valuable time is often lost in bringing the wounded out of the pit to the doctor, and much unnecessary pain, if not agony, is endured by the sufferer in the operation, and all for want of a little general instruction of how to handle a wounded person.

The St. John Ambulance Association, of England, has taken this matter up and caught the attention of the British public, so that to-day all ranks of Society in London crowd their classes for instruction. The movement is spreading throughout the Kingdom, and to show the cause of its popularity, I cannot do better than quote the language of Major F. Duncan, Vice-President of the Association, when advocating the establishment of classes in the colliery districts. He said before the Chesterfield and Derbyshire Institute:—"He supposed that they would all agree that there was much suffering in the world in the time of peace, which it is desirable to ameliorate, and much ignorance, which it is desirable to remove. If peace has its victories, so also, unfortunately, it has its casualties. Yet how often was it that an accident occurred and there was no one present who knew the simplest thing until the doctor arrived; there might be men of education, and possessed of kind hearts, yet utterly ignorant of how to apply pressure of the thumb or the hand in the right place. Their object was to teach men and women how to deal with ordinary cases of injury, until the doctor arrived. They did not aim at usurping the functions of the medical profession: they did not desire to be doctors, but simply tinkers, humble lay helpers. Medical men had always very kindly received their efforts. In every town in which they had commenced, they had given the greatest aid and assistance; and why? Because a doctor knew he was not ubiquitous; he could not always be on hand, and he welcomed ready aid until he arrived.

"Of all things in the world, he knew of nothing more wretched than to stand helplessly by and see a man bleeding to death, and be unable to do anything to help him. A little knowledge might be a dangerous thing, but if that little knowledge could save that man, instead of their standing helplessly wringing their hands, which would they prefer? A little while ago, a lady who sneered at their Society, and whose child had been burnt, said to a young lady who attended their classes, 'What should you have done?' 'Oh,' said the young lady, 'I should have done so-and-so.' 'Why, that's just what the doctor did,' was the reply." Major Duncan among other instances narrated the case of a gentleman of great wealth, who died from an accidental cut from an axe with which he was trying to cut down a

tree, and whose life might have been saved if any one had known how to press the femoral artery with his thumb. He also mentioned the interest taken by the hands in the dockyard and arsenals where accidents are frequent, and said it was no uncommon thing to see the men practising the teachings of the Society, one of them pretending in the dinner hour that he had his arm or leg broken, and the others to bandage him.

The course of instruction adopted extended over six lectures of one hour each.

1. Objects of the work, giving examples of the consequences of sick or injured persons being improperly handled.

2. Positions of the large arteries and veins in the body, with extemporized contrivances for checking bleeding in different regions.

3. Recognition of fractures; application of splints to fractured limbs; hints as to articles which may be extemporized for splints, as well as pads and bandages.

4. Method of lifting injured persons on to or from stretchers in or out of wagon. Carrying stretchers along level roads, up and down stairs, or over rough ground, fences, etc.

5. Means of extemporizing stretchers from articles generally available, or of adapting carts, carriages or wagons, for the carriage of sick or injured persons.

6. The immediate treatment of suspended animation from drowning, or from black damp, fainting, collapse, shock from injuries, burns, or scalds and poisons.

Such instruction in our midst is much needed, and it is to be hoped will before long be popularized. The late calamity at Sydney Mines showed how old-fashioned remedies still cling about people. When the men who fell in the after-damp were dragged out insensible, the rescuers were actually burying their heads in the coal dust, when they were fortunately stopped by Mr. Brown, and the men were sent out to fresh air. Experience has taught many of the miners' wives to deal with burns, and the art of handling simple fractures is not unknown to many colliers, but facilities for conveying the wounded are wanting, and there is a reluctance to supply them, on the plea that the presence of a stretcher would have a bad effect on the men. But why should an inanimate stretcher have a greater chilling effect than the presence of a medical man (who not only is tolerated but courted,) and who may be said to be an animate suggestion of all the ills that flesh is heir to.

In concluding this, my final report, I may be permitted to point to the Laws accepted and enacted, to the legal definitions of hitherto undefined terms, and to the improvements induced in mining discipline, to the comprehensiveness of the Returns now published, effected during my term of office as of some permanent worth. I also desire to express my acknowledgments for the many courtesies shown me by those with whom I have had official dealings.

I have the honor to be, Sir,

Your obedient servant,

HENRY S. POOLE,

*Inspector of Mines.*

TO THE HON. SAMUEL CREELMAN,

*Commissioner of Public Works and Mines.*

## LIST OF MINERAL LEASES (OTHER THAN COAL)

No.	LESSEE.	DISTRICT.	Area Sq. Miles.
	<b>COPPER.</b>		
2	ROSS, Sarah and others..... ANTIGONISH CO.	.....	1
	MOIR, Wm. C. et al..... COLCHESTER CO.	Tatmagouche.....	10½
	<b>LEAD.</b>		
1	McClure, Charles F..... HALIFAX CO.	Gay's River.....	1
	<b>IRON.</b>		
35	Carmichael, John R..... Pictou Co.	East River.....	1
32, 33, 34, 36, 37, 38, 40, 41	Hamilton, John and others.....	" .....	9
39	Hudson, James..... CAPE BRETON CO.	" .....	1
86	Brookman, S. J. et al.....	N. side East River.....	1
84	Protheroe, Pryse..... INVERNESS CO.	Cow Bay.....	1
16	Inverness C. I. & R. Co.....	Whyccomagh.....	1

Total area under lease..... 26½ square miles.

## LIST OF COAL LEASES.

No.	LESSEE.	COLLIERY.	Area Sq. Miles.	WORKING.	AGENT AND Manager.	POSTAL ADDRESS.
1	McKinnon, et al .....	ANTIGONISH Co.	3			
44	Baker, John W .....		1			
13, 14, 15	Black, C. H. M .....		3			
21	Blight, James, et al .....		1			
47	Boston C. M. Co .....		1		John Moffat .....	River Hebert..
25	Campbell, Alex., et al .....		1			
32, 34	Campbell, Alex., et al .....		2			
35, 48, 49, 50	Campbell, Alex .....		4			
31, 33, 37, 38, 40, 41, 45, 46	Campbell, John .....		8			
12	Cumberland C. M. Co .....		4		E. N. Sharp .....	St. John, N. B.
17	Donville, James .....		3		{ B. B. Barnhill... Robert Redpath..	Joggins.
	General Mining Association..		4	working.		
	Joggins C. M. Association ...	Joggins .....	2			
20	Joggins C. M. Co .....	Cumberland .....	2			
18, 19	Kirby, Lewis R .....		1			
5	Livesey, John .....		2			
	Lawson C. M. Association ...	Maccan .....	1			
42	Macfarlane, Alex .....		1			
1, 2, 3, 4	New York & Acadia Co .....	Scotia .....	4	working.	William Bennett...	Maccan.

## LIST OF COAL LEASES.—Continued.

AGENT AND Manager.	POSTAL ADDRESS.
<i>William Hall</i> ..... <i>J. S. Hickman</i> ...	Spring Hill. Amherst.
<i>H. S. Poole</i> ..... <i>J. Maxwell</i> ..... { <i>J. B. Moore</i> ..... { <i>John Greener</i> ...	Stellarton. Westville. New Glasgow.* Vale Colliery.
{ <i>S. Cunard &amp; Co.</i> { <i>James Hudson</i> ..	Halifax. Stellarton.
Robert Simpson ..	Westville.



15, 30, 31	Merigomish Company .....	.....	3		W. W. White ....	Westville.
25	Nova Scotia Company .....	Black Diamond ..	4			
20	Price, D. E., et al .....	.....	2			
24	Richey, M. H. ....	.....	1			
			29	CAPE BRETON Co.		
3	Archibald, Blowers.....	Gowrie.....	1		{ Archibald & Co.	North Sydney.
2	Archibald, Thos. D.....	" .....	1		{ Chas. Archibald.	Cow Bay.
5, 28	Blockhouse Mining Co.....	Blockhouse .....	2		R. Belloni .....	Cow Bay.
29	" (sea area)	.....	1			
72	Brookman, Samuel.....	.....	1			
76, 77	" S., et al.....	.....	2			
15	Caledonia C. & R. Co.....	Caledonia .....	1		David MacKeen..	Caledonia Mines.
31	" (sea area).....	.....	1			
30	Campbell, Alex .....	.....	1		T. D. Archibald ..	North Sydney.
23, 25, 70	Cape Breton Co., (Limited) ..	.....	3		Edgar S. Stirling	Sydney.
14, 24	" " ..	Schooner Pond ...	2		" ...	
49	" " ..	Reserve .....	1		" ...	
64, 65, 68	" " ..	Lorway .....	3		" ...	
69	" " ..	Emery.....	1		" ...	
8, 9	Clyde Coal Mining Co .....	Ontario .....	1½		John Sutherland .	Port Caledonia.
87	Cossitt, Geo. G.....	.....	1			
	General Mining Association..	Bridgeport .....	2			
	" " ..	Sydney .....	5		{ Rich'd H. Brown	Sydney Mines.
	" " ..	" .....	12		{ Cunard & Morrow	Halifax.
27	" " (sea area) ..	" .....	5		Richard Wilson ..	
	" " ..	Lingan.....	10		Donald Lynk ....	Lingan.
	" " ..	" .....	4			

## LIST OF COAL LEASES.—Continued

No.	Leasee.	Colliery.	Area Sq. Miles.	Agent and Manager.	Postal Address.
38, 39	Gen'l Mining Ass'n (sea areas)	Lingan .....	10		
10, 21	Gibson, John, et al. ....	.....	2		
4, 12, 16	Glace Bay Mining Co. ....	Glace Bay .....	3	{ E. P. Archbold . Henry Mitchell .	Halifax. Little Glace Bay.
75	Henry, W. A. ....	.....	1		
22	Ingraham, R. J. & J. L. ....	Halfway .....	1		
6, 13, 18, 19	International C. & R. Co. ....	International .....	4	{ Dodd & Gillies . Patrick Neville .	Sydney. Bridgeport.
71	Jennings, Edward. ....	.....	1		
47	LeCras & McInnes .....	.....	1		
66	Merchant's Bank of Canada .	Gardener .....	2		
74	Moore & Mosely .....	.....	1½		
81	Morton, Lemuel J. ....	.....	1		
80	McDonald, James .....	.....	1		
52, 53	McLeod, Hugh .....	.....	2		
83, 85	Protheroe, Pryse. ....	.....	2		
73, 82	Reid, Thos. S., (sea area). ....	.....	2		
40, 41, 42	Ross, H. E., et al. ....	.....	3		
79	Ross, W. J., et al. (sea area). ..	.....	1		
43	South Head Coal Co .....	South Head .....	1		
32	Sword, Wm., (sea area). ....	.....	3		
54 to 63	Sydney, C. M. Co., (sea areas). ..	.....	10		
46	Todd, A. Thornton .....	Collins .....	1	{ S. N. Robinson . George Scott. ....	North Sydney. Little Bras d'Or.
67	Weatherbe & Kirby .....	.....	1		
78	Weatherbe, R. L., (sea area). ..	.....	5		
34, 35, 36	Victoria C. M. Co., "	Victoria .....	5	W. Routledge. ....	Low Point.



## COAL TRADE BY COUNTIES.

TABLE A.

	CUMBERLAND.		PICTOU.		CAPE BRETON.		OTHER COUNTIES.		TOTAL.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter .....	18,035	16,157	63,614	40,333	29,113	8,973	399	53	111,161	65,516
2nd Quarter .....	28,275	27,066	75,222	63,033	94,685	83,374	663	456	198,845	173,929
3rd Quarter .....	31,695	28,525	91,252	104,620	144,452	137,579	204	555	267,603	271,279
4th Quarter .....	35,868	33,121	85,307	80,417	71,806	69,129	13	120	192,994	182,787
Total .....	113,873	104,869	315,395	288,403	340,056	299,055	1,279	1,184	770,603	693,511
1877 .....	107,004	99,078	306,477	284,155	340,416	301,981	3,599	1,851	757,496	687,065
1876 .....	93,232	84,528	306,390	275,618	304,102	268,808	5,922	5,253	709,646	634,207
1875 .....	64,797	60,944	382,662	337,102	328,425	304,702	5,281	4,047	781,165	706,795

TABLE B.

MARKETS.	CUMBERLAND.		PICTOU.		CAPE BRETON.		OTHER COUNTIES.		TOTAL.		GRAND TOTAL.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	
Nova Scotia—											
Land Sales .....	13,977	6,525	56,021	59,424	1,560	5,288	61	...	71,619	71,237	142,856
Sea-borne .....	....	....	54,960	5,228	73,895	2,650	583	....	129,438	7,878	137,316
Nova Scotia—Total .....	13,977	6,525	110,981	64,652	75,455	7,938	644	....	201,057	79,115	279,172
Quebec .....	....	....	55,301	201	27,813	395	....	....	83,114	596	83,710
New Brunswick .....	70,144	14,100	7,149	1,854	21,592	50	356	....	99,241	16,004	115,245
Newfoundland .....	....	....	465	99	60,573	161	63	....	61,101	260	61,361
P. E. Island .....	....	....	13,773	22,356	5,870	1,292	121	....	19,764	23,648	43,412
United States .....	123	....	5,651	600	70,816	11,305	....	....	76,590	11,905	88,495
West Indies .....	....	....	4,798	....	12,201	....	....	....	16,999	....	16,999
S. America .....	....	....	523	....	....	....	....	....	523	....	523
Europe .....	....	....	....	....	3,594	....	....	....	3,594	....	3,594
Total .....	84,244	20,625	198,641	89,762	277,914	21,141	1,184	....	561,983	131,528	693,511
1877 .....	81,644	17,434	211,707	72,448	282,710	19,271	1,849	2	577,910	109,155	687,065
1876 .....	68,377	16,151	217,530	58,088	247,001	21,807	5,121	132	538,029	96,178	634,207
1875 .....	50,015	10,929	280,551	56,551	287,257	17,445	4,047	....	621,870	84,925	706,795

## COAL—SALES.

MARKETS.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1878.	1877.
Nova Scotia.						
Land Sales ...	37,568	30,972	29,816	44,500	142,856	109,955
Sea-borne ...	8,310	28,971	53,633	46,402	137,316	145,835
N. Scotia—Total	45,878	59,943	83,449	90,902	279,172	255,790
Quebec .....		23,613	50,386	9,711	83,710	95,118
New Brunswick	13,734	29,233	40,001	32,277	115,245	104,818
Newfoundland..	680	16,516	20,580	23,585	61,361	49,342
P. E. Island.....		8,953	22,323	12,136	43,412	45,169
United States...	4,954	30,977	47,504	5,060	88,495	118,216
West Indies . . .	270	4,124	4,382	8,223	16,999	13,660
S. America .....				523	523	573
Europe .....		570	2,654	370	3,594	4,379
Total. ....	65,516	173,929	271,279	182,787	693,511	687,065
1877. ....	47,843	146,079	290,789	202,354	687,065	687,065
1876. ....	32,607	161,788	260,250	179,562	634,207	634,207

## COAL—GENERAL STATEMENT.

1878.	Produce.	Sales.	Colliery Consumption.
1st. Quarter.....Tons...	111,161	65,516	23,933
2nd Quarter .....	198,845	173,929	21,101
3rd Quarter .....	267,603	271,279	19,159
4th Quarter .....	192,994	182,787	24,434
Total. ....	770,603	693,511	88,627
1877. ....	757,493	687,065	98,841
1876. ....	709,646	634,207	113,788
1875. ....	781,165	706,795	124,110

NOTE.—Stocks on hand at the end of the year, 20,307 Tons.

COAL PRODUCE OF NOVA SCOTIA DURING THE YEAR ENDED DECEMBER 31ST, 1878.

MINES REPORT.

COLLIERIES.	SEAMS.	Produce.	SALES.			COLLIERY CONSUMPTION.			
			Bearing Royalty.	Free.	Total.	Per Centage.	Engines.	Workmen.	Per Centage
CUMBERLAND COUNTY.									
Chiegnecto.	.....	100	100	40	140	.....	.....	.....	.....
Joggins.	.....	11,896	8,857	788	9,640	81	800	100	7
Scotia	.....	1,256	882	177	1,059	84	100	.....	8
Spring Hill.	.....	100,621	74,405	19,625	94,030	93	4,518	1,695	6
PICTOU COUNTY.									
Acadia.	.....	57,105	41,050	13,617	54,667	95	1,005	1,373	4
Albion Mines	.....	139,424	64,797	57,320	122,117	87	13,017	3,588	12
Intercolonial	.....	59,211	44,660	7,578	52,238	88	2,066	1,227	5
Nova Scotia	.....	5,160	3,863	993	4,856	94	1,460	319	34
Vale.....	.....	54,495	44,271	10,254	54,525	100	2,632	989	6
CAPE BRETON COUNTY.									
Block-house	.....	60,770	53,844	2,915	56,759	93	1,800	1,691	5
Caledonia	.....	17,348	15,009	4,063	19,072	109	508	540	6
Collins	.....	4,408	2,432	438	2,870	65	2,510	885	77
Emery.....	.....	222	.....	.....	.....	.....	210	12	100
Gardener	.....	.....	.....	.....	.....	.....	600	200	.....
Glace Bay.....	.....	18,806	19,949	480	20,429	108	3,157	1,126	22
Gowrie	.....	33,093	24,977	5,979	30,956	93	1,239	2,440	11
International	.....	13,723	13,545	803	14,348	104	2,990	1,475	32
Lingan	.....	15,210	10,429	1,098	11,527	76	2,792	888	24
Ontario	.....	19,815	18,203	628	18,831	95	262	572	4
Reserve.	.....	9,282	6,480	867	7,347	79	1,268	470	18
Schooner Pond.....	.....	.....	.....	3	3	.....	272	6	.....
Sydney Mines	.....	135,188	102,800	3,566	106,366	78	16,366	5,580	15
Victoria	.....	12,191	10,246	301	10,547	86	2,550	820	27
INVERNESS COUNTY.									
Broad Cove	.....	601	564	.....	564	94	.....	23	4
Chimney Corner.....	.....	110	80	.....	80	72	.....	.....	.....
Port Hood	.....	30	22	.....	22	73.	32	11	.....
VICTORIA COUNTY.									
New Cambellton.....	.....	538	518	.....	518	94	165	278	65
770,603			561,983	131,528	693,511	89	62,319	26,308	11

## MINES REPORT.

Statement of the Number and Classes of Persons employed, and average Results at each Colliery, during the year ended December, 31, 1878.

COLLIERIES.	Underground.				Surface.				Construction.		Total.		Average No. of days per person		Average tons per Cutter.	Average tons day, per Cutter.	Average quantity raised per day—Tons.	Horses.		Pits Worked.
	Cutters.	Laborers.	Boys.	Days Labor.	Mechanics.	Laborers.	Boys.	Days Labor.	Persons.	Days Labor.	Persons.	Underground.	Surface.	Above.				Below.		
Chignecto .....	4	.....	.....	264	.....	2	.....	136	.....	6	400	66	68	25	.....	.....	.....	.....	.....	.....
Joggins .....	29	5	7	8,560	10	9	3	5,268	66	65	13,894	208	239	410	2.	58	4	4	203	.....
Scotia ..	6	1	1	1,023	.....	2	1	490	.....	11	1,513	128	163	209	.....	.....	.....	.....	.....	.....
Spring Hill.....	152	57	41	57,362	26	52	12	20,653	7	347	79,262	229	229	662	2.9	451	4	12	223	.....
Acadia.....	84	15	15	24,505	27	48	2	21,662	.....	191	46,167	215	281	680	3.8	323	13	4	177	.....
Albion Mines.....	229	32	70	77,754	30	111	35	49,146	.....	507	126,900	235	279	609	2.5	566	18	31	246	.....
Intercolonial.....	74	34	24	23,303	24	32	6	18,077	13	207	43,860	169	292	800	5.3	392	8	3	151	.....
Nova Scotia .....	10	7	3	2,993	2	8	3	3,404	.....	33	6,397	149	261	516	3.7	38	2	.....	137	.....
Vale .....	96	24	8	30,394	26	25	5	15,419	.....	184	45,813	237	275	568	3.9	376	5	7	145	.....
Block House.....	89	11	49	22,757	24	29	4	14,209	.....	206	36,966	152	249	705	6.1	528	11	36	115	.....
Caledonia.....	34	4	8	6,353	12	14	3	5,856	.....	75	12,209	138	202	510	4.8	163	8	6	106	.....
Collins.....	17	8	9	6,161	3	16	3	5,116	5	61	11,852	181	232	259	1.9	40	2	3	136	.....
Emery .....	3	10	3	527	3	3	.....	592	.....	22	1,119	33	99	74	.....	.....	.....	1	.....	.....
Glace Bay.....	47	2	10	7,431	23	12	4	9,339	.....	98	16,770	126	240	400	3.6	123	6	5	153	.....
Gowrie.....	74	8	26	13,026	8	26	12	7,377	.....	154	20,403	120	160	447	4.1	306	5	21	108	.....
International.....	54	7	9	6,113	9	10	2	3,581	.....	91	9,694	88	170	254	3.4	188	2	8	73	.....
Lingan .....	37	6	12	7,416	6	22	8	6,731	5	96	14,279	135	187	411	3.8	143	6	7	106	.....
Ontario .....	39	9	3	9,613	9	22	3	6,936	.....	85	16,549	188	204	508	2.6	102	4	3	193	.....
Reserve .....	21	.....	3	3,978	3	4	3	2,210	.....	34	6,188	165	221	442	3.6	75	3	2	123	.....
Sydney Mines .....	213	27	64	67,991	63	88	39	51,406	33	527	127,436	223	271	634	2.5	540	11	30	250	.....
Victoria.....	24	8	6	11,595	17	7	4	10,775	.....	66	22,370	302	384	508	2.	97	1	2	125	.....
Broad Cove.....	2	.....	.....	415	2	2	1	322	7	14	1,242	207	64	301	.....	.....	1	.....	.....	.....
Chimney Corner.....	7	8	.....	122	1	.....	1	58	11	23	382	12	29	16	1.	7	1	.....	16	.....
Port Hood.....	3	.....	.....	60	1	.....	.....	37	.....	4	97	20	37	10	.....	.....	1	.....	.....	.....
New Campbellton.....	14	1	4	1,014	3	4	2	1,074	.....	28	2,088	53	118	38	1.3	19	3	.....	28	.....
	1,362	279	375	300,730	332	548	156	259,874	23	1,356	3,008,860	194	251	566	4.	274	119	185	141	.....



COLLIERY CONSTRUCTION ACCOUNT, 1878.

COLLIERIES.	Shafts.	Slopes.	Adits.	Machinery.	Colliery. Buildings.	Dwellings.	Surface Works.	Railways.	Wharves.	Prospect'g.	TOTAL.
CUMBERLAND CO.											
Chiegnecto .....	.....	.....	340.00	.....	.....	.....	40.00	.....	.....	.....	380.00
Joggins.....	.....	1153.50	.....	1,410.00	125.00	.....	.....	.....	.....	.....	2,688.50
Scotia .....	.....	.....	100.00	.....	.....	.....	.....	.....	.....	.....	100.00
Spring Hill .....	.....	.....	.....	3,500.00	600.00	2,400.00	500.00	340.00	.....	203.75	7,543.75
PICTOU CO.											
Acadia .....	.....	.....	.....	4,476.13	939.75	.....	.....	.....	.....	8,122.56	13,538.44
Albion Mines .....	.....	.....	.....	56.87	.....	.....	.....	.....	.....	.....	56.87
Intercolonial.....	.....	.....	492.79	227.09	.....	.....	125.70	1,345.45	1,838.14	.....	4,029.17
Vale .....	.....	750.00	.....	1,500.00	.....	.....	.....	.....	.....	308.00	2,558.00
CAPE BRETON CO.											
Collins .....	72.25	42.46	102.13	552.26	279.45	.....	389.20	.....	580.46	.....	4,018.21
Gowrie .....	.....	.....	398.00	.....	.....	.....	.....	.....	.....	.....	398.00
Lingan .....	.....	.....	1075.75	.....	438.31	.....	.....	.....	.....	.....	1,514.06
Ontario .....	.....	101.00	631.60	900.00	15.00	.....	800.00	.....	.....	.....	2,447.60
Sydney Mines .....	1931.25	.....	.....	253.80	66.84	.....	1,998.02	858.43	1,530.83	.....	6,639.17
INVERNESS CO.											
Broad Cove .....	.....	.....	583.10	.....	.....	690.80	371.60	.....	390.72	6.60	2,042.82
Chimney Corner .....	.....	.....	250.00	.....	160.00	.....	.....	.....	.....	.....	410.00
VICTORIA CO.											
New Campbellton.....	.....	.....	500.00	.....	.....	.....	.....	.....	.....	.....	500.00
	\$2,003.50	\$2,046.96	\$4,473.37	\$12,876.15	\$2,624.35	\$3,090.80	\$4,224.52	\$2,543.88	\$4,340.15	\$8,640.91	\$46,864.59

COAL SALES in Nova Scotia from 1785 to 1878 (Inclusive.)

YEAR.	SALES.	TOTAL.	YEAR.	SALES.	TOTAL.
1785	1,668	14,349	1831	37,170	839,981
1786	2,000		1832	50,396	
1787	10,681		1833	64,743	
1788			1834	50,813	
1789			1835	56,434	
1790			1836	107,593	
		1837	118,942		
		1838	106,730	1,533,798	
		1839	145,962		
		1840	101,198		
		1841	148,298		
		1842	129,708		
		1843	105,161		
		1844	108,482		
		1845	150,674		
		1846	147,506		
		1847	201,650	2,998,829	
		1848	187,643		
		1849	174,592		
		1850	180,084		
		1851	153,499		
		1852	189,076		
		1853	217,426		
		1854	234,312		
		1855	238,215		
		1856	253,492		
		1857	294,198		
		1858	226,725		
		1859	270,293		
		1860	322,593		
				4,927,339	
		1861	326,429		
		1862	395,637		
		1863	429,351		
		1864	576,935		
		1865	635,586		
		1866	558,520		
		1867	471,185		
		1868	453,624		
		1869	511,795		
		1870	568,277		
				5,734,143	
		1871	596,418		
		1872	785,914		
		1873	881,106		
		1874	749,127		
		1875	706,795		
		1876	634,207		
		1877	697,065		
		1878	693,511		
				Total.....	15,803,286

S U M M A R Y .

1775 to 1790	14,349	1831 to 1840	839,981
1791 " 1800	51,048	1841 " 1850	1,533,798
1801 " 1810	70,452	1851 " 1860	2,399,829
1811 " 1820	91,527	1861 " 1870	4,927,339
1821 " 1830	140,820	1871 " 1878	5,734,143

*Nova Scotia exported to the United States.*  
COAL.

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	98,173	24 ad.	1866	404,252	\$1.25
1851	116,274	"	1867	338,492	"
1852	87,542	"	1868	228,132	"
1853	120,764	"	1869	257,485	"
1854	139,125	Free.	1870	168,180	"
1855	103,222	"	1871	165,431	"
1856	126,152	"	1872	154,092	.75
1857	123,335	"	1873	264,760	"
1858	186,743	"	1874	138,335	"
1859	122,720	"	1875	89,746	"
1860	149,289	"	1876	71,634	"
1861	204,457	"	1877	118,216	"
1862	192,612	"	1878	88,495	"
1863	282,775	"			
1864	347,594	"			
1865	465,194	"			

NOTE.—The quantities given for the Years 1850 to 1872 are on the authority of the Board of Trade, Philadelphia, and are probably underestimated. At least, the figures given by the Board of Trade for the year 1873, the only year available for comparison with the comprehensive tables now published by this Department, are 12 per cent. below those given in the above table.—H. S. P.

## GOLD.

## GENERAL STATEMENT FOR THE YEAR 1878.

*Shewing the number of Mines at work, days labour performed, quantity of Quartz, &c., crushed, yield of Gold, &c., for the Twelve months ended December 31st.*

DISTRICTS.	Number of Mines.	Days Labour.	Mills employed.	Steam Power.	Water Power.	Quartz, &c., Crushed.	Yield per Ton.			Maximum yield per Ton.			Total yield of Gold.			Average yield per man per day for twelve months, at \$18.00 per oz.
							Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	
Caribou .....	6	9,188	3	3	...	929	1	2	2	2	13	12	1,026	12	16	\$2.01
Gay's River .....	2	3,620	4	4	...	1,126	...	4	7	...	10	12	243	11	16	1.21
Montagu .....	2	2,065	3	3	...	192	...	16	12	3	6	17	158	6	12	1.37
Oldham .....	3	10,599	2	1	1	1,808	...	19	5	9	8	20	1,737	9	9	2.95
Renfrew .....	1	1,769	1	...	1	380	...	8	5	1	16	...	155	17	10	1.58
Sherbrooke .....	15	50,827	7	4	3	9,340	...	14	17	5	2	17	6,843	1	15	2.42
Stormont .....	1	3,015	...	...	...	74	1	8	19	1	14	11	106	10	...	0.64
Tangier .....	4	10,146	3	1	2	1,035	...	11	7	4	2	18	584	10	22	1.03
Uniacke .....	4	5,711	2	2	...	704	...	17	21	6	2	9	629	5	7	1.98
Waverley .....	3	6,727	2	1	1	1,197	...	8	8	1	9	...	498	12	8	1.33
Wine Harbor .....	2	4,471	2	1	1	814	...	12	2	8	13	14	492	13	12	1.98
Unproclaimed, &c. ....	2	2,284	2	...	2	391	...	5	3	...	9	7	100	10	15	.79
	45	110,422	31	20	11	17,990	...	13	23	9	8	20	12,577	1	22	\$2.05

# MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

MONTH.	CARIBOU.							GAY'S RIVER.							MONTAGU.						
	No. Mines.	Days Labour.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labour.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labour.	Men.	Tons.	Oz.	Dwt.	Gr.
January . . . . .	4	188	7	51	39	7	4	1	226	9	45	22	18	7	2	246	9	10	2	15	14
February . . . . .	5	316	12	108	81	3	20	1	240	9	125	30	6	2	3	289	11	19	9	2	22
March . . . . .	6	249	10	56	45	6	18	1	326	12	75	15	10	18	2	166	6	8	3	17	..
April . . . . .	7	792	30	40	25	2	12	2	327	13	60	19	6	17	3	125	5	35	44	15	6
May . . . . .	7	926	36	40	60	16	10	2	287	11	86	22	0	23	3	236	9	19	17	12	..
June . . . . .	6	977	38	77	94	6	19	1	239	9	60	13	17	19	3	438	17	50	42	13	..
July . . . . .	6	972	37	114	117	15	18	3	356	14	170	13	10	6	1	125	5	12	7	10	18
August . . . . .	6	1,019	39	78	139	9	8	3	419	16	241	24	13	23	3	156	6	8	22	5	12
September . . . . .	6	804	31	87	104	10	1	3	362	14	135	25	15	3	3	143	6	..	..	..	..
October . . . . .	7	947	36	91	116	17	8	3	277	10	49	23	15	4	1	40	2	27	5	9	..
November . . . . .	7	1,108	43	74	94	17	17	3	282	14	47	18	17	1	2	67	3	4	2	5	12
December . . . . .	6	890	34	113	106	19	1	3	279	11	33	12	19	13	1	34	1	..	..	..	..
	6	9,188	..	929	1,026	12	16	2	3,620	..	1,126	243	11	16	2	2,065	..	192	158	6	12

## MONTHLY STATEMENT FROM EACH GOLD DISTRICT—(Continued).

MONTH.	OLDHAM.							RENFREW.							SHERBROOKE.						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January .....	3	511	20	46	11	15	10	1	310	12	33	20	...	...	15	4,221	162	746	648	14	12
February .....	3	169	6	65	50	4	18	1	305	11	38	18	9	...	13	3,960	152	428	493	10	12
March .....	3	679	26	65	311	13	6	1	143	12	22	13	14	...	13	4,012	154	799	778	10	12
April .....	2	725	28	*231	174	8	5	1	154	6	21	12	13	...	12	3,744	144	527	468	19	...
May .....	3	865	33	†173	†285	16	3	1	105	4	9	11	14	...	12	4,212	162	835	641	10	...
June .....	3	892	34	†245	*236	18	2	1	92	4	12	5	16	...	12	4,200	161	1,109	641	14	6
July .....	3	1,194	46	136	45	9	18	1	131	5	28	5	11	...	16	4,860	187	405	401	9	9
August .....	4	1,156	44	101	150	8	7	1	138	5	34	9	9	22	18	4,806	184	506	448	1	...
September ..	4	1,529	59	§199	††105	5	...	1	203	8	36	22	2	...	18	4,832	186	990	663	5	4
October .....	3	971	37	81	74	2	...	..	...	...	...	...	...	...	16	4,735	182	758	473	2	22
November ..	3	988	38	277	166	16	20	1	100	4	23	6	11	4	18	3,614	139	1,168	669	16	12
December ..	2	920	35	189	124	11	16	1	86	3	124	29	17	8	18	3,640	140	1,069	514	7	22
	3	10,599	...	1,808	1,737	9	9	1	1,769	...	380	155	17	10	15	50,827	....	9,340	6,843	1	15

\*138 tons Slate. †75 tons do. ‡125 tons do. §147 tons do. ||26 oz. 4 dwt. from Slate. ¶19 oz. from do. \*\*24 oz. 10 dwt. from do. ††22 oz. from do.

# MONTHLY STATEMENT FROM EACH GOLD DISTRICT—(Continued).

MONTH.	STORMONT.							TANGIER.							UNIACKE.						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January . . . . .	1	287	11	...	...	...	...	4	745	29	57	7	19	...	2	440	17	63	52	7	17
February . . . . .	1	287	11	...	...	...	...	5	819	31	...	...	...	...	4	442	17	40	36	16	7
March . . . . .	1	288	11	...	...	...	...	5	882	38	128	87	9	...	3	311	12	44	19	2	...
April . . . . .	1	293	11	...	...	...	...	5	765	29	44	23	16	...	3	94	4	12	20	1	...
May . . . . .	1	293	11	38	65	10	...	4	881	34	81	54	13	2	3	583	22	53	56	2	18
June . . . . .	1	293	11	...	...	...	...	3	858	37	105	88	6	1	5	499	19	83	56	3	13
July . . . . .	1	297	11	...	...	...	...	4	504	19	20	28	5	10*	7	857	33	118	59	18	...
August . . . . .	1	297	11	...	...	...	...	5	1,267	49	20	36	11	10†	5	597	23	48	27	18	...
September . . . . .	1	298	11	...	...	...	...	3	1,228	47	...	4	3	4‡	4	562	22	74	138	13	...
October . . . . .	..	.....	...	36	41	...	...	3	673	26	100	53	5	...	3	371	14	67	62	9	...
November . . . . .	2	152	6	...	...	...	...	3	696	27	41	36	4	6	4	208	8	33	37	18	...
December . . . . .	2	230	9	...	...	...	...	3	828	32	439	163	18	13	6	747	29	69	61	16	...
	1	3,015	...	74	106	10	...	4	10,146	...	1,035	584	10	22	4	5,711	....	704	629	5	7

\* 3.18.0 from Specimens.

† 9.9.10 from Plates.

‡ From Plates and Specimens.

MONTHLY STATEMENT FROM EACH GOLD DISTRICT—(Continued).

MONTH.	WAVERLEY.							WINE HARBOR.							UNCLAIMED, &c.						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January . . .	4	397	15	107	40	11	..	1	172	7	65	32	6	..	1	114	4	..	..	..	..
February.....	4	405	16	83	40	6	..	1	184	7	7	9	10	..	2	180	7	61	11	13	8
March . . . . .	4	748	29	87	37	16	..	1	143	5	47	28	2	..	2	424	16	118	19	..	..
April . . . . .	2	550	21	108	51	13	..	1	153	6	86	46	6	..	3	675	26	†104	4	13	15
May . . . . .	4	661	25	83	36	9	10	1	252	10	43	40	..	..	3	426	5	11	47	15	9
June . . . . .	5	590	23	98	*44	16	16	1	336	13	68	50	13	12	4	145	4	37	1	10	18
July . . . . .	3	663	26	100	41	13	6	2	464	18	72	38	7	..	3	145	1	4	1	12	14
August . . . . .	3	556	21	106	46	12	..	2	665	25	99	57	5	..	1	1	1	3	..	12	20
September . . .	4	471	18	115	44	16	..	2	602	23	113	61	1	..	1	13	1	..	..	..	..
October . . . . .	3	607	23	124	42	15	..	3	656	25	159	66	16	..	1	39	2	16	2	16	11
November . . . .	1	599	23	95	39	8	..	2	232	9	23	6	14	..	2	100	4	31	9	7	4
December . . . .	2	480	18	91	31	16	..	3	612	23	32	55	13	..	1	22	1	6	1	8	12
	3	6,727	....	1,197	498	12	8	2	4,471	....	814	492	13	12	2	2,284	....	391	100	10	15

\* 3 oz. 1 dwt. from Plates.

† Sand and Gravel.



## GOLD.

### GENERAL ANNUAL SUMMARY.

Year.	Total ounces of Gold extracted			Quartz Crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average earnings per man per day and year, at 300 working days, \$18 per oz.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		A Day.	A Year.
1862	7,275			6,473	1	2	11	156,000	\$ .83	\$249
1863	14,001	14	17	17,002		16	11	273,624	.92	276
1864	20,022	18	13	21,434		18	16	252,720	1.42	426
1865	25,454	4	8	24,423	1	0	20	212,966	2.15	645
1866	25,204	13	2	32,161		15	2	211,796	2.14	642
1867	27,314	11	11	31,386		17	9	218,894	2.24	672
1868	20,541	6	10	32,262		12	17	241,462	1.58	459
1869	17,868	0	19	35,147		10	4	210,938	1.52	456
1870	19,866	5	5	30,829		12	21	173,680	2.05	615
1871	19,227	7	4	30,791		12	11	162,994	2.12	636
1872	13,094	17	6	17,093		15	7	112,476	2.09	627
1873	11,852	7	19	17,708		13	9	93,470	2.28	684
1874	9,140	13	9	13,844		13	5	77,246	2.12	636
1875	11,208	14	19	14,810		15	4	91,698	2.20	660
1876	12,038	13	18	15,490		15	13	111,304	1.94	582
1877	16,882	6	1	17,369		19	10	123,565	2.46	788
1878	12,577	1	22	17,990		13	23	110,422	2.05	615
	283,570	16	15	376,212				2,835,255		

### DISTRICT SUMMARY.

#### CARIBOU.

Year.	Total ounces of Gold extracted.			Stuff Crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwts. at \$0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwts.	
1869	1,001	0	23	1,583		12	17	11,076	1.80	\$1.62
1870	613	11	2	755		16	6	6,500	1.88	1.64
1871	504	15	23	479	1	1	1	2,964	3.40	3.06
1872	209	15	0	368		11	9	2,184	1.92	1.72
1873	17	16	12	21		16	23	312	1.14	1.02
1874	368	10	23	333	1	2	3	4,651	1.58	1.42
1875	446	12	19	368	1	4	6	3,675	2.46	2.18
1876	727	4	10	542	1	6	11	6,000	2.39	2.15
1877	2,596	13	23	1,735	1	9	21	14,579	3.56	3.20
1878	1,026	12	16	929	1	2	2	9,188	2.23	2.01

## MONTAGU.

Year.	Total ounces of Gold extracted.			Stuff crushed.	Yield per Ton of 2000 lbs.			Total days labor.	Average yield per man per day in dwt. at \$0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwts.	
1863	366	14	16	140	2	16	2	38,688	.18	\$0.16
1864	1,052	19	14	545	1	18	15	11,492	1.83	1.64
1865	902	12	23	615	1	9	8	12,376	1.45	1.30
1866	496	15	10	382	1	6	0	6,032	1.64	1.47
1867	436	15	16	244	1	15	11	7,826	1.11	.99
1868	584	14	22	350	1	13	0	7,384	1.58	1.42
1869	805	13	14	572	1	8	3	8,944	1.80	1.62
1870	3,831	9	5	916	4	3	14	15,106	5.06	4.55
1871	3,152	8	15	848	3	14	8	15,938	3.95	3.55
1872	1,793	10	6	683	2	12	12	13,832	2.59	2.33
1873	1,440	3	9	679	2	2	9	10,972	3.62	2.35
1874	655	0	22	496	1	6	10	5,452	2.40	2.16
1875	287	18	17	72	3	19	23	2,526	2.27	2.05
1876	149	1	17	81	1	16	19	1,404	2.83	2.38
1877	50	1	9	55		18	5	1,405	.71	.64
1878	158	6	12	192		16	12	2,065	1.53	1.37

## OLDHAM.

1862	51	0	0	84	12	3	4,368	.23	\$0.20	
1863	1,223	3	21	1,026	1	4	6	25,896	.94	.84
1864	1,750	5	12	2,238	15	11	37,934	.94	.84	
1865	1,126	11	20	2,236	10	1	18,278	1.23	1.10	
1866	956	12	20	966	19	19	11,362	1.68	1.51	
1867	1,100	3	14	870	1	5	7	15,418	1.42	1.27
1868	719	0	4	1,012	14	4	8,008	1.79	1.61	
1869	1,894	16	0	1,735	16	1	17,576	1.58	1.42	
1870	2,051	15	3	2,644	15	12	20,254	2.02	1.81	
1871	1,718	12	12	1,374	1	4	4	13,494	2.54	2.28
1872	1,014	11	10	793	1	5	14	8,580	2.36	2.12
1873	998	2	17	662	1	10	3	6,994	2.85	2.46
1874	665	8	11	527	1	5	6	3,420	3.86	3.27
1875	915	8	3	550	1	13	6	6,100	3.00	2.70
1876	1,953	5	23	1,705	1	2	21	15,757	2.47	2.22
1877	2,527	19	13	2,015	1	5	2	14,144	3.57	3.21
1878	1,737	9	9	1,808	19	5	10,599	3.27	2.95	

## RENFREW.

Year.	Total ounces of Gold extracted.			Quartz crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwt. at \$0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwt.	
1862	308	8	0	171	1	15	10	10,920	.56	\$0.50
1863	785	7	7	575	1	7	7	21,216	.74	.66
1864	1,172	6	5	1,229		19	1	12,220	1.91	1.71
1865	1,008	10	18	927	1	1	18	14,430	1.39	1.25
1866	6,423	15	11	6,003	1	1	9	38,142	3.36	3.02
1867	7,904	19	2	7,222	1	2	4	61,308	2.57	2.31
1868	3,373	14	9	5,994		11	6	39,598	1.70	1.58
1869	3,097	15	7	7,258		8	12	34,606	1.79	1.61
1870	1,171	18	11	3,243		7	2	11,310	2.07	1.86
1871	1,179	17	16	2,463		9	4	10,972	2.15	1.93
1872	323	3	8	855		7	13	5,668	1.14	1.02
1873	59	16	18	255		4	16	2,028	.59	.53
1874	3	3	7	10		6	7	190	.33	.29
1875	47	16	6	113		8	11	690	1.38	1.24
1876	75	14	10	164		9	5	1,307	1.15	1.03
1877	207	13	4	294		14	3	3,543	1.17	1.05
1878	155	17	10	380		8	5	1,769	1.76	1.58

## SHERBROOKE.

1862	2,023	0	0	663	3	1	0	22,464	1.80	\$1.62
1863	3,304	14	12	3,454		19	8	31,200	2.11	1.89
1864	3,419	14	20	2,673	1	6	8	32,630	2.09	1.88
1865	3,424	1	21	2,511	1	7	6	23,010	2.97	2.67
1866	5,829	13	8	2,853	2	0	20	22,490	5.18	4.66
1867	9,463	18	0	7,378	1	5	15	35,958	5.31	4.78
1868	7,070	0	5	9,880		14	7	59,540	2.37	2.13
1869	5,546	11	16	11,500		9	15	41,964	2.64	2.37
1870	7,134	4	0	11,428		12	11	48,880	2.91	2.61
1871	6,579	19	7	13,882		9	9	50,856	2.58	2.32
1872	4,188	9	21	5,213		15	17	38,246	2.21	1.98
1873	5,026	0	4	7,187		15	9	31,460	3.19	2.87
1874	4,037	1	2	5,480		14	20	31,199	2.58	2.32
1875	5,818	15	10	6,443		18	1	38,683	3.00	2.70
1876	5,176	15	15	6,205		16	16	37,269	2.77	2.49
1877	8,237	3	10	8,654		19	1	47,725	3.45	3.10
1878	6,843	1	15	9,340		14	17	50,827	2.69	2.42

## STORMONT.

Year.	Total ounces of Gold extracted.			Stuff crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwts. at \$0.90.	
	Oz.	Dwt.	Gr.		Oz.	Dwt.	Gr.		Dwt.	\$
1862	397	0	0	197	2	0	7	12,792	.62	.55
1863	1,587	13	12	526	3	0	7	15,600	2.03	1.82
1864	1,510	4	21	636	2	7	11	25,844	1.16	1.04
1865	1,696	6	2	1,040	1	12	14	25,350	1.29	1.16
1866	1,254	17	9	2,253		11	2	11,208	2.28	2.00
1867	1,266	16	15	782	1	11	3	12,428	2.03	1.82
1868	678	2	17	596	1	2	14	14,560	.92	.82
1869	227	0	13	590		7	16	6,110	.74	.66
1870	578	5	15	1,525		7	13	6,552	1.76	1.58
1871	559	7	21	1,937		5	18	5,590	2.00	1.80
1872	472	0	11	543		17	9	4,316	2.18	1.96
1873	37	18	5	181		4	4	882	.91	.81
1874	167	19	20	236		14	5	1,799	1.86	1.67
1875	267	6	18	620		8	14	2,543	2.10	1.89
1876	267	0	5	370		14	10	3,607	1.48	1.33
1877	240	19	0	96	2	10	4	3,310	1.45	1.30
1878	106	10	0	74	1	8	19	3,015	.71	.64

## TANGIER.

1862	865	0	0	707	1	4	11	39,000	.44	.39
1863	494	7	21	655		15	2	37,440	.26	.23
1864	602	7	8	698		18	10	16,380	.74	.66
1865	644	7	13	639	1	0	4	18,156	.97	.87
1866	296	5	21	791		7	11	9,074	.65	.58
1867	691	14	7	724		19	2	6,864	2.01	1.80
1868	921	8	9	725	1	4	7	11,700	1.57	1.35
1869	1,192	3	10	1,332		17	21	15,938	1.49	1.34
1870	1,814	2	10	2,732		13	6	29,328	1.23	1.11
1871	2,093	0	7	2,924		14	7	27,326	1.53	1.38
1872	829	8	15	1,622		10	5	10,426	1.59	1.43
1873	726	11	15	1,070		13	4	8,892	1.63	1.46
1874	419	7	5	706		11	21	5,092	1.64	1.47
1875	448	2	15	1,106		8	1	6,667	1.34	1.21
1876	312	18	0	716		10	6	8,274	.92	.82
1877	410	14	15	364	1	2	13	5,102	1.61	1.42
1878	584	10	22	1,035		11	7	10,146	1.15	1.03

## . UNLACKE.

YEAR.	Total ounces of Gold extracted.			Stuff crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwt. at \$0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwt.	
1866	72	16	9	28	2	12	0	1,326	1.09	\$0.98
1867	1,622	13	20	1,968		16	12	14,274	2.27	2.04
1868	3,247	3	17	3,874		16	16	27,898	2.32	2.08
1869	1,867	3	12	3,172		11	18	22,022	1.69	1.52
1870	566	14	5	1,794		6	7	6,214	1.82	1.63
1871	360	17	3	900		8	0	4,342	1.66	1.49
1872	241	10	0	364		13	7	1,950	2.47	2.22
1873	129	8	18	198		13	1	1,222	2.52	2.26
1874	14	1	0	19		14	19	60	4.68	3.81
1875	139	3	3	319		8	17	2,643	1.05	.94
1876	227	14	10	321		14	4	4,752	.96	.86
1877	663	15	9	470	1	8	6	7,252	1.83	1.64
1878	629	5	7	704		17	21	5,711	2.20	1.98

## WAVERLEY.

1862	1,507	0	0	3,741		8	1	46,800	.66	\$0.59
1863	2,380	6	3	6,755		7	1	58,344	.81	.72
1864	6,410	4	22	9,288		13	23	88,244	1.44	1.29
1865	14,404	4	9	12,518	1	3	0	87,308	3.29	2.96
1866	8,612	17	11	16,750		10	6	98,800	1.74	1.56
1867	3,942	5	2	10,510		7	12	46,436	1.69	1.52
1868	2,387	8	22	6,372		7	11	36,972	1.26	1.13
1869	1,591	14	10	3,915		8	3	16,796	1.89	1.70
1870	811	8	21	2,619		6	4	13,546	1.19	1.07
1871	1,427	18	12	2,772		10	6	17,472	1.62	1.45
1872	1,047	17	0	1,761		11	21	12,766	1.64	1.47
1873	1,009	0	0	2,013		10	0	13,520	1.49	1.34
1874	1,553	12	15	1,682		18	11	12,541	2.47	2.22
1875	1,740	1	0	1,313	1	6	12	18,807	1.85	1.66
1876	1,539	7	0	1,661		18	12	21,107	1.45	1.30
1877	866	18	10	1,422		12	4	14,261	1.21	1.09
1878	498	12	8	1,197		8	8	6,727	1.48	1.33

## WINE HARBOR.

YEAR.	Total ounces of Gold extracted.			Stuff crushed.	Yield per ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwt. at \$0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwt.	
1862	1,688	0	0	835	2	0	10	12,792	2.63	\$2.36
1863	3,718	2	19	3,644	1	0	10	36,688	2.02	1.81
1864	4,033	3	7	4,136		19	12	22,984	3.50	3.15
1865	2,200	5	14	3,833		11	11	16,588	2.65	2.38
1866	1,012	8	4	1,881		10	18	8,814	2.29	2.06
1867	845	18	14	1,670		10	3	13,390	1.26	1.13
1868	1,248	6	3	2,938		8	12	23,166	1.00	.90
1869	719	8	19	2,726		5	6	20,462	.70	.63
1870	914	15	14	2,356		7	17	8,034	2.27	2.04
1871	1,538	6	16	2,927		10	4	11,232	2.74	2.46
1872	2,572	10	18	2,305	1	2	7	8,840	5.82	5.23
1873	2,000	0	3	2,267		17	15	12,688	3.15	2.83
1874	633	11	6	1,193		10	14	5,605	2.26	2.03
1875	492	11	22	1,140		8	15	3,942	2.49	2.24
1876	1,217	19	7	1,929		12	15	7,848	3.10	2.79
1877	580	14	3	1,068		10	21	5,772	2.01	1.80
1878	492	13	12	814		12	2	4,471	2.20	1.98

## OTHER DISTRICTS.

1862	436	0	0	75	5	19	10	6,864	1.26	\$1.13
1863	141	3	2	225		12	13	6,552	.43	.38
1864	66	12	0	38	1	15	0	4,992	.27	.24
1865	47	3	8	102		9	6	2,470	.38	.34
1866	248	10	19	250		19	23	4,550	1.09	.98
1867	39	6	17	16	2	9	3	4,992	.15	.13
1868	316	6	22	518		12	5	12,636	.50	.45
1869	424	12	15	761		11	3	15,444	.54	.48
1870	378	5	15	812		9	7	7,956	.95	.85
1871	112	2	16	281		8	0	2,808	.79	.71
1872	402	0	13	2,552		3	3	5,668	1.41	1.26
1873	407	9	13	3,175		2	13	4,550	1.79	1.61
1874	622	16	18	3,212		3	21	7,327	1.70	1.53
1875	604	18	2	2,766		4	9	5,422	2.23	2.00
1876	331	17	17	1,796		3	14	3,978	1.67	1.50
1877	499	13	1	1,196		8	8	6,473	1.54	1.39
1878	344	2	7	1,517		4	13	5,904	1.16	1.04

*Statement of Coals (in tons) received at the several Stations from Mines in Nova Scotia for the year ending 31st Dec., 1878.*

STATIONS.	QUANTITY.	STATIONS.	QUANTITY.
Halifax.....	20,842	Bro't forward..	180,478
Bedford.....	146	Sussex . . . . .	378
Windsor Junction....	2,422	Apohaqui.....	30
Enfield.....	268	Norton.....	24
Elmsdale . . . . .	62	Passekeag . . . . .	28
Milford . . . . .	36	Hampton.....	416
Shubenacadie . . . . .	332	Rothsay . . . . .	214
Stewiacke . . . . .	178	Cold Brook.....	342
Brookfield . . . . .	40	Saint John . . . . .	6,050
Truro . . . . .	3,776	Chatham . . . . .	12
Valley . . . . .	22	Bathurst . . . . .	54
Glengarry.....	18	New Mills.....	12
Hopewell.....	116	Charlo.....	6
Stellarton . . . . .	10	Campbellton . . . . .	32
New Glasgow.....	2,142	Rimouski . . . . .	10
Pictou Landing.....	84,128	Riviere du Loup....	6
Debert . . . . .	72	Three-mile House...	426
Londonderry.....	40,270	Four-mile House....	72
Wentworth . . . . .	12	Malcolm's Siding....	350
Greenville . . . . .	20	Rocky Lake . . . . .	66
Thompson . . . . .	40	Oakfield . . . . .	30
Oxford.....	268	Moir's Siding.....	20
Spring Hill.....	10	Miller's Siding.....	6
Athol . . . . .	18	Logan's Siding.....	20
Maccan . . . . .	30	Waterloo . . . . .	6
Amherst . . . . .	1,408	Crowson's Siding....	42
Aulac.....	76	Isgonish.....	6
Sackville . . . . .	790	Folly Lake . . . . .	20
Dorchester . . . . .	18,266	Jones' Siding . . . . .	6
Memramcook . . . . .	144	Boundary Creek....	18
Shediac . . . . .	54	Nappan . . . . .	48
Point du Chene.....	24	Culhoun's . . . . .	6
Moncton . . . . .	1,350	Brookville . . . . .	60
Salisbury.....	2,746	Little Forks . . . . .	6
Petitcodiac . . . . .	294	Fort Lawrence . . . . .	18
Penobsquis. . . . .	48		
Carried forward..	180,478	Total.....	189,318

## INTERCOLONIAL RAILWAY.

*Statement shewing the quantities in tons of the different kinds of Coal received from various Mines for the use of the Intercolonial Railway during the year 1878.*

MONTHS.	Albion Mines.			Vale.	Drummond.	Spring Hill.
	Round.	Small.	Coke.	Round.	Round.	Round.
January .....	2,606	60	.....	.....	.....	5,728
February .....	2,014	116	.....	.....	.....	1,642
March .....	1,648	40	.....	.....	.....	3,257
April .....	1,520	70	20	.....	.....	3,222
May .....	1,550	111	10	435	.....	5,280
June .....	978	.....	.....	2,174	.....	3,662
July .....	38	78	.....	1,715	180	4,438
August .....	.....	140	10	1,297	792	4,856
September .....	.....	483	10	819	757	4,389
October .....	.....	226	.....	.....	1,678	5,934
November .....	.....	11	.....	.....	2,315	8,050
December .....	.....	11	10	.....	2,258	7,115
	10,354	1,346	60	6,440	7,980	57,573

(Signed) D. POTTINGER

General Storekeeper's Office,  
Moncton, N. B., 5th February, 1879.



COALS		COKE	
Forwarded from the following Stations :		Forwarded by Albion :	
STATIONS.	Quantity.	STATIONS.	Quantity— Tons.
New Glasgow.....	47,452	Halifax .....	60
Stellarton .....	61,348	Truro .....	20
Spring Hill.....	35,326	Stewiacke.....	20
Albion .....	25,998	Londonderry.....	12,320
Drummond .....	18,994		
Maccan .....	200		
Total.....	189,318	Total.....	12,420

E. & O. E. MONCTON, N. B., 4th February, 1879.  
(Sd.) J. J. WALLACE, Auditor.

IRON MINING.

Iron Ore.....	36,600 tons.	Workmen employed underground....	123
Ankerite.....	3,102	“ on the surface...	22
	39,702 tons.	Total....	145

MANGANESE MINING.

No. 1.	Quality of Ore.....	79 tons @ \$55 per ton.	Average number
No. 2.	“ “ .....	48 “ @ \$45 “	of workmen, 14
		127 tons.	

GYPSUM QUARRIES.

Windsor.....	47,496 tons.
Cheverie.....	28,603 “
Maitland .....	3,270 “
Walton .....	2,610 “
Hantsport ....	942 “
Wallace .....	80 “
Total....	83,001 “ Valued at \$71,635.

MOULDING SAND.

Windsor.....	555 tons. \$555.
--------------	------------------

BUILDING SMONE.

Wallace.....	3,175 tons. \$11,390.
“ Rubble Stone—	619 tons.

## FINANCIAL STATEMENT.—GOLD.

*Mines Department for Twelve Months ended December 31st, 1878.*

DISTRICTS.	RECEIPTS.		EXPENDITURE.				
	Rents.	Royalty.	Totals.	Return of Rents.	Return of Royalty.	Royalty Commission.	Salaries Surveyors, &c.
Caribou .....	\$126.00	\$428.40	\$554.40	.....	\$108.58	\$33.32	.....
Fifteen Mile Stream.....	.....	20.87	20.87	.....	.....	.....	.....
Gay's River.....	6.00	108.98	114.98	.....	.....	4.31	.....
Lawrencetown.....	.....	8.18	8.18	.....	.....	.20	.....
Montagu .....	100.00	51.05	151.05	.....	.....	.....	.....
Oldham .....	44.00	606.66	650.66	\$4.00	.....	23.92	.....
Ovens .....	8.00	.....	8.00	.....	.....	.....	.....
Renfrew.....	12.00	48.84	60.84	2.00	.....	3.64	.....
Sherbrooke .....	110.00	2,528.24	2,638.24	.....	.....	130.04	\$720.00
Stormont .....	14.00	.....	14.00	.....	.....	.....	27.50
Tangier .....	2.00	155.91	157.91	.....	.....	6.47	.....
Uniacke .....	38.00	271.73	309.73	.....	.....	9.24	.....
Unproclaimed .....	20.00	.....	20.00	.....	.....	.....	.....
Wagamatcook .....	2.00	.....	2.00	.....	.....	.....	.....
Waverley .....	.....	185.10	185.10	.....	.....	9.59	.....
Wine Harbor.....	6.00	146.07	152.07	.....	.....	7.17	.....
Prospecting Licenses ..	.....	.....	476.38	.....	.....	.....	(Return) 9.75
	\$488.00	\$4,560.03	\$5,524.41	\$6.00	\$108.58	\$227.00	\$747.50
							\$1,099.73

# OTHER THAN GOLD.

Mines Department for Twelve months ended December 31st, 1878.

COUNTIES.	RECEIPTS.				EXPENDITURE.		
	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Return Licences to Search.	Return Licenses to Work.	Totals.
Antigonish .....	\$140.00	\$50.00	.....	\$190.00	.....	.....	.....
Cape Breton .....	540.00	375.00	\$19,892.31	20,807.31	\$40.00	\$50.00	\$90.00
Colchester .....	120.00	.....	.....	120.00	.....	.....	.....
Cumberland .....	200.00	75.00	7,051.17	7,326.17	.....	.....	.....
Guysborough .....	20.00	.....	.....	20.00	20.00	.....	20.00
Hants .....	40.00	.....	.....	40.00	.....	.....	.....
Inverness .....	120.00	.....	.....	120.00	.....	.....	.....
Kings .....	20.00	.....	.....	20.00	.....	.....	.....
Lunenburg .....	20.00	.....	.....	20.00	.....	.....	.....
Pictou .....	140.00	75.00	15,926.42	16,131.42	.....	.....	.....
Richmond .....	20.00	50.00	.....	70.00	.....	.....	.....
Victoria .....	40.00	.....	.....	40.00	.....	.....	.....
	\$1,420.00	\$625.00	\$42,859.90	\$44,904.00	\$60.00	\$50.00	\$110.00

FINANCIAL STATEMENT.—GOLD.  
*Mines Department for Twelve Months ended December 31st, 1878.*

DISTRICTS.	RECEIPTS.			EXPENDITURE.				
	Rents.	Royalty.	Totals.	Return of Rents.	Return of Royalty.	Royalty Commission.	Salaries Surveyors, &c.	Totals.
Caribou .....	\$126.00	\$428.40	\$554.40	.....	\$108.58	\$33.32	.....	\$141.90
Fifteen Mile Stream.....	.....	20.87	20.87	.....	.....	.....	.....	.....
Gay's River.....	6.00	108.98	114.98	.....	.....	4.31	.....	4.31
Lawrencetown.....	.....	8.18	8.18	.....	.....	.20	.....	.20
Montagu .....	100.00	51.05	151.05	.....	.....	.....	.....	.....
Oldham .....	44.00	606.66	650.66	\$4.00	.....	23.92	.....	27.92
Ovens.....	8.00	.....	8.00	.....	.....	.....	.....	.....
Renfrew.....	12.00	48.84	60.84	2.00	.....	3.64	.....	5.64
Sherbrooke .....	110.00	2,528.24	2,638.24	.....	.....	130.04	\$720.00	850.04
Stormont .....	14.00	.....	14.00	.....	.....	.....	27.50	27.50
Tangier .....	2.00	155.91	157.91	.....	.....	6.47	.....	6.47
Uniacke .....	38.00	271.73	309.73	.....	.....	9.24	.....	9.24
Unproclaimed .....	20.00	.....	20.00	.....	.....	.....	.....	.....
Wagamatcook .....	2.00	.....	2.00	.....	.....	.....	.....	.....
Waverley .....	.....	185.10	185.10	.....	.....	9.59	.....	9.59
Wine Harbor.....	6.00	146.07	152.07	.....	.....	7.17	.....	7.17
Prospecting Licenses ..	.....	.....	476.38	.....	.....	.....	(Return)	9.75
	\$488.00	\$4,560.03	\$5,524.41	\$6.00	\$108.58	\$227.90	\$747.50	\$1,099.73

# OTHER THAN GOLD.

Mines Department for Twelve months ended December 31st, 1878.

COUNTIES.	RECEIPTS.				EXPENDITURE.		
	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Return Licences to Search.	Return Licences to Work.	Totals.
Antigonish .....	\$140.00	\$50.00	.....	\$190.00	.....	.....	.....
Cape Breton .....	540.00	375.00	\$19,892.31	20,807.31	\$40.00	\$50.00	\$90.00
Colchester .....	120.00	.....	.....	120.00	.....	.....	.....
Cumberland .....	200.00	75.00	- 7,051.17	7,326.17	.....	.....	.....
Guysborough .....	20.00	.....	.....	20.00	20.00	.....	20.00
Hants .....	40.00	.....	.....	40.00	.....	.....	.....
Inverness .....	120.00	.....	.....	120.00	.....	.....	.....
Kings .....	20.00	.....	.....	20.00	.....	.....	.....
Lunenburg .....	20.00	.....	.....	20.00	.....	.....	.....
Pictou .....	140.00	75.00	15,926.42	16,131.42	.....	.....	.....
Richmond .....	20.00	50.00	.....	70.00	.....	.....	.....
Victoria .....	40.00	.....	.....	40.00	.....	.....	.....
	\$1,420.00	\$625.00	\$42,859.90	\$44,904.00	\$60.00	\$50.00	\$110.00

ABSTRACT ACCOUNT.

RECEIPTS AND EXPENDITURE for the Twelve months ended December 31st, 1878.

RECEIPTS.		EXPENDITURE.	
Licenses to Search Coal .....	\$1,420.00	Return Licenses to Search Coal....	\$60.00
“      “      .....	625.00	“      “      Work      “      .....	50.00
Royalty .....	42,859.90		\$110.00
	\$44,904.90		
Rents .....	488.00	Return Rents.....Gold..	6.00
Royalty .....	4,560.03	“      “      .....	108.58
Prospecting Licences “ .....	476.38	“      “      Prospecting Licences “ ..	9.75
	5,524.41	Royalty Commission.....“ ..	227.90
		Salaries and Surveys.....“ ..	747.50
			1,099.73
		General Expenses .....	5,383.47
		Postage .....	70.24
		Stationery.....	143.01
			5,596.72
	\$50,429.31		\$6,806.45
	\$50,429.31		\$6,806.45

# REPORT

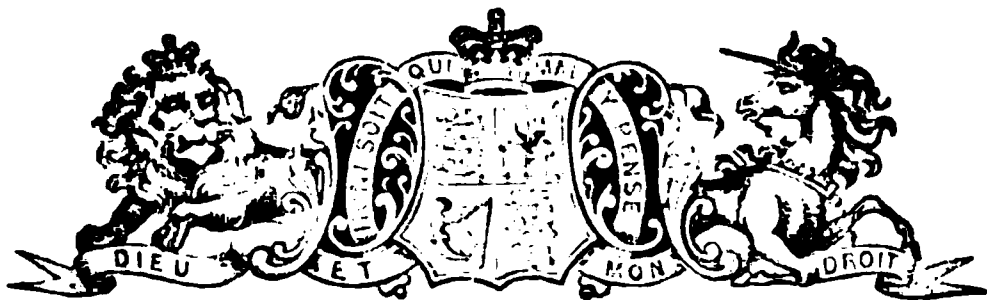
OF THE

## DEPARTMENT OF MINES,

NOVA SCOTIA,

FOR THE YEAR 1879.

---



HALIFAX, N. S.:

ROBERT T. MURRAY, QUEEN'S PRINTER,

1880.





**REPORT**  
**OF THE**  
**DEPARTMENT OF MINES,**  
**NOVA SCOTIA,**  
**FOR THE YEAR 1879.**

---



**HALIFAX, N. S.:**  
**ROBERT T. MURRAY, QUEEN'S PRINTER,**  
**1880.**

THE NEW YORK  
PUBLIC LIBRARY

11830

THE NEW YORK  
PUBLIC LIBRARY

# CONTENTS.

---

	Page
Minerals raised.....	1
Coal Mining in 1879—Cumberland Co.....	2
Pictou Co.....	3
Cape Breton Co.....	6
Other Counties.....	8
Gold Mining.....	9
Copper “.....	13
Iron “.....	14
Fire Clay.....	15
Accidents.....	16
Ventilation.....	19
Fire Damp.....	20
Safety Valve.....	22
Slack Coal.....	22
Explosions.....	23
Gold Mining Economies.....	24
Papers on Nova Scotia Mineralogy.....	25
List of Copper, Lead and Iron Leases.....	27
“ Coal Leases.....	28
TABLES.—COAL.—Trade by Counties.....	33
General Statement.....	35
Colliery Production.....	36
“ Labor Returns.....	37
“ Construction Account.....	38
Coal Sales 1785 to 1879.....	39
Exports to U. States 1850 to 1879.....	40
GOLD.—General Statement, 1879.....	41
District Statements, 1879.....	42
District Annual Summaries.....	46
Coal transported by Intercolonial R. R. etc., and Miscellaneous Returns.....	52
Financial Statements.....	56



# REPORT

ON THE

## MINES OF NOVA SCOTIA,

FOR THE YEAR ENDING 31ST DEC., 1879.

BY EDWIN GILPIN, JR., A. M., F. G. S., *Member of the Newcastle  
Institute of Mining Engineers, Mining Engineer,  
and Chemical Analyst.*

OFFICE OF INSPECTOR OF MINES,  
Halifax, Feb. 26th, 1880. }

THE HONORABLE

SAMUEL CREELMAN,

*Commissioner of Public Works and Mines:*

SIR,—I beg leave to submit the following Report on the various Mining industries of the Province, carried on during the past year.

In addition to a detailed notice of the operations at each mine during the year; and the usual statistical tables, a summary is given of the amount of minerals exported, which do not pay Royalty to the Government of the Province.

In accordance with the custom followed in late Reports of this Office, I venture to append a few remarks on Mining improvements and appliances adopted in other countries, in the hope that some of them may, on reflection, appear to warrant a trial here.

During the present keen competition for markets throughout the world, especially in the Coal Trade, every labor and time-saving economy is required, especially by those conducting Mining operations under climatic and other conditions less favorable than with those in the neighboring States.

The following summary shows, as far as I have been able to learn, the extent of the Mineral production of Nova Scotia during 1879:—

Gold .....	Ounces....	13,801
Iron Ore .....	Tons. ....	29,889
Manganese Ore .....	" ....	145
Coal Raised .....	" ....	*788,273
Coke Made .....	" ....	9,646
† Gypsum .....	" ....	95,126
† Building Stone .....	" ....	5,562
† Barytes .....	" ....	480
† Limestone .....	" ....	9,444
Fireclay .....	" ....	50
Grind-stones, Etc .....	" ....	1,675

Through the kindness of the Collectors of Customs, at the Ports specified, I give further details under this head.

\* Ton of 2,240 lbs.

† Quantities shipped, amounts used in Nova Scotia, unknown.

‡ For Iron Smelting.

## COAL TRADE.

---

The total sales for the year 1879, amount to 688,624 tons, being a decrease over the sales of 1878, of 4,883 tons.

The sales of Round Coal, however, are 12,923 tons in excess of those of 1878, which would make the value of the Coal sales this year, at least equal to those of the preceding one.

The most noticeable points in the trade were, the increase in the sales to Quebec and Ontario, the amounts sold in these Provinces in 1879, being 154,118 tons, against 83,710 tons in 1878.

The shipments to New Brunswick, have decreased slightly. The sales in Newfoundland and Prince Edward Island are about the same as in the preceding year.

The amount sold in the United States, was 51,641, the smallest sales recorded since 1850.

The sales to the West Indies fell off from 16,999 tons, in 1878, to 10,124 tons, in 1879.

---

## CUMBERLAND COUNTY.

The total trade of this County amounted to 90,671 tons against 104,869 tons in 1878. This decrease would perhaps not have appeared but for an unavoidable suspension of work owing to a disagreement with the workmen at Spring Hill, lasting 5 weeks; the trade with New Brunswick also declined.

### COLLIERIES.

**JOGGINS.**—The new slope has been sunk during the past year to a depth of 200 feet, and levels turned East and West. A counter balance has been made on each side of the slope, and bords driven in some distance, leaving a twenty-feet pillar next the railway level. The pillar working in the second level to the east of the slope has been finally abandoned.

**SCOTIA.**—A few tons were mined for local sale, and the faces of the level slightly extended.

**CHIGNECTO.**—At this Colliery, the level started in the fall of 1878 has been continued to about 700 feet, and bords turned to the full rise. At present the level has 70 feet of cover, which will increase to 160 in a short distance.

The coal is now carefully hand-picked, and its reputation is good, as a strong lasting house coal, in Amherst and neighboring villages.

The tramway has been put in order as far as Maccan Station, and

---

several cars built ; a few tons have been shipped over the Intercolonial Railway to Amherst, etc.

The Collieries in this section of the District will be in a good position to share in any brighter prospects of trade, as they are at no great distance from suitable loading places at Sackville and Dorchester, and are the nearest by rail to Quebec and Ontario.

STYLES.—A few tons were taken out as samples during the past year, and it is proposed to continue the level during the present winter. The coal is found well adapted for house use, and from its appearance should also be suitable for gas purposes.

SPRING HILL.—The acquisition of the four square mile area of the General Mining Association of London, which covered the extension to the dip of the seams worked by the Spring Hill Co., has added greatly to the value of this property.

In the main or north seam the extraction of the bord and panel pillars, in the Eastern workings, has been continued. The Western railway level has been re-opened through the broken and carried into the newly acquired territory. It has been driven of a good size and well timbered in view of the extensive winning before it.

In the South seam the levels have been continued, and four counter-balances driven. The pillars in the second balance in the East side are being removed.

A Telephone has been put up to connect the engine-house and the bottom of the slope, and has proved very serviceable. A stationary fire-engine has been built at the mine, and placed beside the fitting shop. A screen has been built suitable for loading the box cars used on the Intercolonial Railway.

A little prospecting was done on the Black and adjoining areas, confirmatory of previous explorations, and at one or two other points, about which I have no information.

---

## PICTOU COUNTY.

### GENERAL REMARKS.

The trade of this County has increased during the past year, the returns showing that 330,878 tons of coal were sold, an increase of 42,475 tons over the sales of 1878.

This production would have been still larger but for two causes, the temporary stoppage of the Londonderry Blast Furnace, and the strike at the Drummond Colliery in December.

The most notable feature in the trade of the County has been the increase of sales to Quebec and Ontario, from 55,501 tons in 1878 to 103,217 tons in 1879.

## COLLIERIES.

**ACADIA.**—The operations of extracting the pillars from the lower levels have been satisfactorily continued; the necessary precautions being taken of lamps, shot-firers, and the use of the wedge in the bords nearest to the old grove.

The new winning has been driven down to give a lift of about 300 feet of coal.

The water and railway levels have been driven east and west about 600 feet, and counterbalances turned away. In order to keep the pillars between the levels of as regular a shape as possible, on account of the increasing weight, the horse roads are driven at a heavier angle than usual, and the horse's load lightened by the adoption of a counterbalance system. The amount of air passing in the lowest level, in October, was 18,000 feet. The coal from this seam is carefully prepared, and the stove size finds a ready sale. A feed-water heater, on the principal of Wright's patent, has been satisfactorily used. A connection has been made with the railway of the Nova Scotia Colliery, and the plant and wharf of the latter Company have been utilized for shipping coal at Middle River.

**ALBION.**—In the main seam operations have been continued to the rise in the south and north sides of the pit. The dip slants have been continued and open up a large extent of coal. The north slant is now approaching the north level, which will be found beneficial in ventilation and carriage of coal to the shaft.

The amount of air passed by the fan in May was 65,660 cubic feet.

The water from the old workings has been almost exhausted, and the large pump now raises the water from both main and deep seams.

It is proposed to introduce locomotives driven by compressed air to do the underground haulage on the levels; the air to be supplied from reservoirs filled by compressors placed at bank.

The following analyses made, during the past year, at the works of the Gas Light and Coke Company, of London, will show that the coal from the new winnings of this seam is of very excellent gas quality. No. 1 refers to the North Side Dip Slant, and No. 2 refers to the South side Dip Slant. An average of three trials gave:—

No. 1.....10,300 cubic feet of gas per ton, 2,240lbs.

“ 2.....10,450 “ “ “ “

• Illuminating power equal to fifteen candles.

The yield of coke being:—

No. 1.....14 cwt. 1 qr. 2 lbs. per ton.

“ 2.....14 “ 2 “ 7 “ “

**DEEP SEAM.**—The work in the winning in this seam from the Ford pit tunnel has been discontinued for the present. Operations have been resumed in the dip workings, which have been pushed north and south; a balance of eight bords being worked on the south side. The cylinder of the underground engine has



been replaced by one 24 inches in diameter, and the road carefully graded, so that a daily extraction of 500 tons can be reached. The coal in the lowest level has increased to 14 feet in height. At bank scales have been put up, and the coal is paid for by weight. The total sales from these Mines was 112,441 tons.

Since writing the above, I learn that the Halifax Co. purpose erecting at once a pair of 36 inch steam cylinders compressing, with a 6 foot stroke in 40 inch cylinders, air, to a pressure of 40 lbs.—which is conveyed underground in pipes to drive two pairs of 12 inch engines, arranged to haul coal from the north and south dip slants of the Ford pit. The steam for the compressor will be furnished by multi-tubular boilers. The introduction of compressed air is a novelty in our coal mining, and its application will doubtless be watched with much interest. A new locomotive also has been ordered from Black, Hawthorn & Co.

INTERCOLONIAL.—The pillars on the upper level, next the western boundary, were brought back, and the lower levels driven nearly to the line; and the extraction of pillars commenced. The lower levels going east are being rapidly pushed, and precautions taken against gas, and two new balances driven.

The fault to the south has been cut by a pair of incline drifts, and the preparatory work of winning out is being pushed.

An exploratory bord is being driven to test the quality of a small block of coal lying next the fault, which will be taken out if found satisfactory.

NOVA SCOTIA.—There has been no coal mined at this Colliery. As already mentioned, the rolling stock and wharf were utilized by the Acadia Company.

VALE.—During the past season the slopes for the new winning have been driven 530 feet to the dip, and the levels turned north and south. The coal is found to preserve its thickness of 7 feet, and remains free from any partings. The wide work and extraction of pillars has been regularly continued during the year on the upper and lower levels on each side of the pit.

The west furnace has been rebuilt and made 9 feet wide, and 20 feet has been added to the stack, giving a heated air column of 110 feet.

A small winding engine, of the following dimensions, has been erected to facilitate the sinking of the slopes and ultimately to draw the coal on the levels, viz:—Two 10 inch cylinders, geared to drive two 4 feet 6 inch drums. The engine is very compact, occupying a space 7 feet 9 inches long, by 9 feet 6 inches wide, and 5 feet high. The bed plates are of cast iron, having the crank and drum shaft bearings cast on; the cylinders and drums are placed between them. The drums are fitted with clutches, and the full set of levers so arranged that they can all be handled without change of position by the driver.

The pumping is done by a Blake pump recently erected, having an 8 inch cylinder, 12 inch stroke, double-acting 5 inch plunger, working against a pressure of 155 lbs. per square inch.

## CAPE BRETON COUNTY.

The sales of coal from this County are 36,128 tons less than last year.

The sales to Quebec, have increased materially, while the sales to the United States have fallen off 46,077 tons.

### COLLIERIES.

**SYDNEY.**—The new winnings have got fully in working order, and the completeness of the arrangements at bank and underground, may be inferred from the raising of 932 tons in one working day, which, I believe, is the largest amount yet recorded from a single pit in the Province. The north and south planes are now working, and the extraction of coal has begun in accordance with the plans laid down at the inception of the workings. The bords on the south level have also been worked during the summer.

The ventilating fan, of the Guibal pattern, now in course of erection, is 30 feet in diameter, and 10 feet wide. Its engine has one horizontal cylinder, 24 inches in diameter, and a 24 inch stroke.

The under-ground engine on the north side of the pit, has two horizontal cylinders, 15 inches diameter, and a 30 inch stroke; the one on the south side has two horizontal cylinders, 16 inches diameter, and 24 inch stroke.

The introduction of a mechanical ventilator, the first in Cape Breton, will, it is hoped, lead to their more extended adoption in this district.

**LINGAN.**—New bords have been started on the south No. 2 level, and pillars have been removed on the same side.

The air circulating in July was 20,000 cubic feet per minute.

A new pump has been set up to take the surface water from No. 2 level, and that raised by a Cameron pump from No. 4 level, and to discharge it at bank, or into the shore adit. The following are the dimensions of the pump, which was built at the Sydney Mines:—

Steam cylinder, 15 inches; water cylinder, 6 inches, 24 inch stroke, driven by 24 lbs. of steam from boilers at bank, 824 feet distant. During the summer the channel to the loading shoots was deepened by dredging.

**VICTORIA.**—No mining operations have been conducted at this colliery during the past year.

**COLLINS.**—Operations have been suspended at this colliery also during the past year.

**RESERVE.**—This is the only colliery of the Cape Breton Company that has been worked during the past season. About 40 men were

---

employed in driving bords in No. 4 levels on the north and south side, and also in No. 3 level, north. The workings were aired by four splits, giving with scales, about 18,000 cubic feet. During the summer the coal was shipped from Sydney; in the fall the Louisburg Pier (also belonging to the same Company) was fitted for shipping, and several cargoes loaded.

**INTERNATIONAL.**—The works of the pit both above and below ground recived extensive repairs. The inclines, levels and traveling roads, were re-timbered when necessary. The heapstead, and rolling stock and pier, were also put in order. The bords to the south of the dip slant levels, and on the north side levels, were extended. It is proposed to put a dam in the old shore levels at a point where they are in stone, in order to prevent any possible influx of sea water flowing into the dip works.

**LITTLE GLACE BAY.**—The operations of the past year have been continued, and the coal is found to maintain its quality, that on the south side being a little tender and requiring spragging. The rise drifts were continued, to hit the dip slants of the Harbor pit level, and were holed through in the autumn. The ventilation is maintained by the exhaust steam from the pump, and amounted at the time of my visit, to 2,400 cubic feet per minute. It is expected during the coming season that a Dominion dredge will be employed to deepen the harbor and approaches.

**CALEDONIA.**—The operations at this colliery have not been extensive. The coal required was obtained by operations similar to those of the previous year. On the surface, several repairs have been performed, and new boilers have been set up in place of two old ones which have been taken out.

**ONTARIO.**—The operations of the preceding year were continued to the south on the lower level, and have advanced about 200 feet. Nineteen bords were in course of working in July, and were aired by about 4,500 cubic feet of air from natural ventilation.

**BLOCK HOUSE.**—The coal mined has been taken chiefly from the pillars; a few bords have been driven toward the outcrop on the northern edge of the basin. The coal passes directly from the working places to the ships, and is weighed on the wharf in rakes of eight boxes—the men being paid by measurement. A loaded cellular bréastwork of squared timber has been carried along part of the seaward face of the loading wharf.

During the summer the amount of air passing was found to be 12,600 cubic feet.

**GOWRIE.**—The bords and workings of the preceding year were continued to meet the demand. It is to be hoped that the prospects of the coal trade will soon warrant the utilisation of the fine shaft and winding gear of the new or western winning.

The amount of air circulating was found to be 6,900 cubic feet.

**GARDINER.**—All mining operations have been suspended at this Colliery during the past year.

## OTHER LOCALITIES.

**BROAD COVE.**—A small portable engine of 10 horse-power has been set up, and an incline started which cuts the former levels obliquely. A screen has been put up and new tubs provided. The facilities at the dam have been improved to permit of scows being loaded at all tides. It has been again proposed to open McIsaac's pond on the same property, which would afford a safe loading place.

**PORT HOOD.**—Since the boiler explosion, no steps have been taken toward re-opening beyond replacing the destroyed boilers by a new set of similar pattern.

**NEW CAMPBELLTON.**—A counter balance has been driven in the south side. The north level has been enlarged for a horse road, a system of long wall adopted which is said to answer well, and to produce better coal at a lower cost. The adit has been continued across the slope to the face of the north workings; the surface water has been cut off by it, and the lower workings are kept dry by a few hours' pumping per week. From the return made by the Agent, the ventilation during the fall was 10,000 cubic feet.

Prospecting was carried on during the fall in a lease adjoining the Broad Cove Mines, and an adit driven a short distance on the Big or 12 foot seam.

---

## GOLD MINING.

---

### GENERAL REMARKS.

The total yield of Gold during 1879 was 13,501 ozs. 8 dwts. 10 grs. against 12,557 ozs. 1 dwt. 22 grs. in 1878.

The yield per ton has also averaged 4 dwt. higher than in the preceding year from a lessened tonnage of quartz crushed. The yield per man has been \$2.34 per day. The tribute system has been continued with its evils unabated. The uncovered shafts, which abound in many of the Districts, have been frequently complained of. I have generally found those engaged in permanent work willing to keep them protected, but this necessary precaution is often avoided by the tributors, who seldom remain long at one place.

---

### DISTRICTS.

---

**CARRIBOU.**—Mining has been almost at a standstill in this District during the past summer. A few small lots were taken out by tributors on the free claim and other places. It is to be hoped that on the decision of an important law suit connected with the district, mining will soon be more vigorously prosecuted.

**MOOSE RIVER.**—Operations were conducted at this point in some cases with fair returns—a lot of 29 tons, from area 27, giving 32 oz. 19 dwt., and 135 tons from area 173, yielding 137 oz. 9 dwt. 13 grs.

This district, though yielding some very rich boulders and otherwise promising well, has not come up to the expectations of those interested. The depth of the soil and the presence of swampy ground cause much delay and expense in prospecting.

**FIFTEEN MILE STREAM.**—A considerable amount of prospecting was done here during the summer. The Halls opened a curiously contorted lead believed to yield at the rate of about 2 oz. Promising leads were reported to have been found on the properties of Messrs. Hudson and Greener. Both the crushers are out of repair, but preparations are being made to repair the Pictou mill.

**GAY'S RIVER.**—But little work was done here during the past year. Messrs. Wilson & Corbil were the chief parties mining. They put up a small battery at the old dam, and continued the works on the south of the brook.

**LAWRENCETOWN.**—Mr. Crook did a little work on his areas near the bridge, and crushed a few tons of trial quartz from Chozzetcook.

**MONTAGU.**—This locality affords another instance of the fluctuations attending the various gold districts of the Province. Mention has been made in previous Reports of promising boulders of rose-colored quartz, which were supposed to have come from a very rich lead in the eastern part of the district. Several attempts have been made to trace these boulders to their source, but unsuccessfully until this spring, when Mr. G. Stuart and his associates succeeded in finding the lead. It has since been successfully worked, having yielded from 127 tons, 675 oz., 17 dwt., 8 grains. It has been sold to a party of American gentlemen for \$50,000, and operations are to be vigorously prosecuted during the winter.

On the Symonds property a lead has been opened to the west of the mill, which has yielded well at the junction of numerous cross leads which intersect it—one crushing of 50 tons from area 1361, having given 147 oz.

Mr. Sutherland reports having discovered the same lode about 800 feet to the eastward, where it shows gold estimated at  $\frac{1}{2}$  oz. to the ton; and search was made for a rich cross-vein.

A few parcels of quartz were taken from the Temple and other properties, but systematic work was confined to the first mentioned properties.

**WAVERLY.**—But little has been done in this district during the past year. In the spring the barrel quartz was sunk to on area No. 113, but was not found profitable. On the west side the Wilder, Brook, and Johnstone lodes were tested.

On the Buckner property Mr. T. J. Wallace was engaged in refitting the old water mill; a new flume was built. Two 4 stamp batteries were put up, and the old wheel and other machinery utilized. He tested a number of lodes, and re-opened the mine on the lake shore, but I am not aware of permanent operations being initiated.

**OLDHAM.**—A few tons of rich quartz were taken from the barrels of the north Wallace lode where it crosses the main road.

Mr. Baker worked on the north load, at the apex of the turn, stoping the south, and on cross veins coming in on the face of the dip. During the summer a large quantity of dump was picked, washed and crushed, and yielded 3 to 4 dwt.

Mr. Donaldson discontinued his winter and spring work on the Britannia lode, and turned his attention to the Hall lode on the north range, which promised well on area 358, and yielded 215 oz. 6 dwts. from 22 tons. Work was also done on leaders from the Britannia lode, and on the Stirling area, on the Frankfort lead.

**RENFREW.**—This district has made small returns. Work on the Hay lead was discontinued.

Mr. Haydon re-opened the Preeper lode close to the brook, but later on he opened the Old Time lead, west of the split, and stoped from a shaft 60 feet deep.



A few men were engaged during the summer in taking out blocks of quartz left near the crop of various old workings. The unusual scarcity of water impeded work very much during the season.

**SHERBROOKE.**—The output from this district was 7,389 ozs. against 6,848 ozs. in 1878, the yield from 9,209 tons averaging 16 dwt. 1 gr. as compared with 14 dwts. 17 grs. in 1878.

The workings of the Wellington Company on the Dewar lode were 440 feet deep in the new west shaft, and four stopes carried about 150 feet to the west.

On the middle lode the west shaft was sunk 100 feet, and three stopes carried to the west.

A new lode was found about 45 feet south of the old Wellington which gave 5 dwts. on trial, and a shaft was sunk on the south lode.

On the adjoining property Mr. Williams continued the operations of last year to the westward.

Tribute work was carried on in the Hayden & Derby, Gladstone, Chicago, New York and other properties with varying success.

On the Wentworth area, Mr. Hattie worked on the big lode, and took a large amount of gold from a small side lode,  $1\frac{1}{2}$  to 2 inches thick. On the Caledonia area, work was carried on by McNab and others on the same lode, of which  $5\frac{1}{2}$  tons gave 42 ozs. 10 dwts.

Messrs. Bent & Fraser worked successfully on the Dominion area, and stoped out the width of 7 feet to a depth of 70 feet, and purpose working the same lode in the adjoining area to the west.

At Cochran's Hill work was carried on by Mr. Cumming in the slate belts near the high road. About 8 feet of slate holding 6 lodes was being mined at the time of my visit. At Campbell's mine, several lodes were tested, and a belt near the crest of the hill was worked to some extent, about 3 feet of whin and slate were taken out holding a 2 inch and two smaller lodes. The average yield was about 7 dwts.

**STORMONT.**—Work was carried on only by Mr. Gallagher, on the north lode, by sinking shafts about 80 feet apart and stoping to the west. The quartz raised was crushed at Sherbrooke, and yielded fairly.

**TANGIER.**—At Mooseland work was done on the Irving lode, and two hundred feet of stoping carried to the west, from a 50 feet shaft; work was also done at other points.

At Tangier Mr. Townsend continued his operations at Strawberry Hill; a pump, driven by the mill engine, was put in a shaft on the Forrest lode, about 300 feet west of the Mooseland road, and was expected to drain about 1,200 feet of the lode. The Dunbrack lode was worked from the Ward shaft and other points. Blocks were also taken out of the Wallace lode.

Messrs. Barton & Murphy worked on the eastern extension of the Nigger and South lodes, and a slate lode to the north, holding 4 small veins. The tunnels driven from the Lake bank cut several lodes, some of which will, it is anticipated, prove profitable to work.

The Leary lead was worked during the winter, and after standing through the spring, was re-worked in the fall, and stopes carried about 75 feet to the east; the quartz maintaining its average yield.

The area holding the Field lode, lying west of Copper Lake, was purchased by Messrs. Torrance and Scaife in the fall, who purpose organizing a Company and to put up a mill on the River.

The Messrs. Ferguson's have worked the Field lode on tribute; a crushing in December, gave 17 dwts.

UNIACKE.—Work has not been brisk this summer. On the Uniacke Company's area a shaft was sunk to test a lode 250 feet west of the mill.

On the south lode, a good deal of tributing was done, much of the quartz averaging slightly over one ounce. The nugget lode was worked in the spring, and yielded well for some time.

WINE HARBOR.—Work was continued on the Eldorado area. The Hattie lode yielded several good crushings. Work was also done on the Mitchell lead, and consisted chiefly in taking out blocks. The west Cassitt belt was worked to some extent in the fall.

On the Barrens, a little preliminary work was done in lodes that it was considered would yield a margin. Prospecting was done to the north, but not, I believe, giving satisfactory results.

---

From Ecum Secum, a few tons were taken to Sherbrooke, and gave paying results, but work was not continued.

At Harrigan's Cove a fresh mill license was taken out, and preparations were being made in the fall for resuming work.

Prospecting was done at Gold River and other points along the Eastern Shore, and discoveries of gold were reported from the Cumberland Mountains, Musquodoboit, South Mountain, but no systematic extraction has yet been commenced.



---

## COPPER MINING.

---

At Eagle Head, Gabarus Bay, in pre-Silurian felsites, a little work has been done on copper pyrites, associated with arsenical pyrites, bismuth glance, iron pyrites, molybdenite and traces of gold, occurring in a band of quartz four feet wide.

Openings were also made on the farm of Angus McDonald, French Road, where copper pyrites occurs in a compact felsite; and on the Gillis Lake Road, where a soap-stone rock of irregular composition holds iron and copper pyrites with green carbonate.

It is stated that Mr. Francis Ellershausen will test the above mentioned deposits during the present winter.

Near Leitches Creek, 12 miles from Sydney, a good deal of prospecting was done, on an exhibit of copper pyrites in strata of laurentian age, consisting of felsites passing into quartzites and hornblendic rocks.\*

During the past season operations were carried on for a short time at Polson's Lake, and two shafts sunk about 60 feet, but work was shortly afterwards suspended.

The copper ores of Tatamagouche are still receiving attention, and the new holders of the lease purpose testing them during the ensuing summer.

In King's County, a lead of quartz holding copper ore has been tested to some extent. The prospects are said to be good, and the enterprise of Mr. T. Hale and his friends in thoroughly testing the lode is deserving of every success. The ore consists of gray, vitreous, blue and green carbonates, yielding on assay up to 25 oz. of silver per ton of 2,000 lbs.

Discoveries of copper ore were reported from Musquodoboit, and Cheticamp in Cape Breton, but I am in possession of no details.

---

\* Geo. Sur. 1875-6, p. 374.

## IRON MINING

---

No returns of Iron Mining have been made to the Department except from the works of the Steel Co. of Canada, at Londonderry. Here the operations of extracting ore have been continued at the West Mines, and the opening to the Cumberland Mines completed. The preparatory driving of adits has also been continued.

Work was resumed at the East Mines in September, and has been continued from the upper adit.

New ore and fuel sheds have been erected, and the furnace lift converted from an inclined to a vertical one. The furnace which was put out of blast has been refitted, and the other is now successfully running at the rate of 450 tons a week. The coke ovens have been repaired, and the admixture of raw coal found to work well in the furnace.

The works have been benefitted by the increased duty, and it is to be hoped that the present demand for iron may induce shipments of ores from other localities to the United States, if the proprietors do not see their way to the erection of works.

In reference to the more phosphoric ores of the Province, it may be remarked that they promise to become workable by the Thomas Gilchrist process, as by this method pig iron holding 1.4 Phosphorous and 1.4 of Silicon, and nearly 2.0 Phosphorus and 1.0 of Silicon, has given a satisfactory product in Germany, and the process appears to be considered practically workable in England.

## FIRE CLAY.

Some 40,000 brick have been made from a bed of fire-clay, 4 feet thick, overlying the McGregor seam, Pictou Co., on the property of the Halifax Co. The clay is considered by Mr. Jamme to be the best plastic clay he has ever used. It will be a matter of congratulation if, after so many trials, a clay has been found fulfilling the severe requirements of the blast and puddling furnaces.

Attention has been turned to the altered white, weathering, slatey felsites, of the Coxheath Hills, of which the following analysis is by Mr. Hoffman, G. S. R., 1875-6, p. 423:—

Silica.....	76.260
Alumina.....	19.152
Fenic Oxide.....	Trace.
Magnesia.....	.170
Lime.....	.552
Soda.....	.159
Potash.....	.100
Water.....	4.300
	<hr/>
	100.698

From experiments made by the analyst, and detailed *ibid*, this material appears suitable for the manufacture of fire-brick.

## ACCIDENTS.

During the year 1879, the following fatal accidents occurred:—

1. Feb. 19.—George Chistopher—Laborer, Vale Colliery—Rope broke while riding on loaded tubs in main slope.
2. June 9th.—W. Boutilier,—Collier, Reserve,—Taking down coal loosened by shot.
3. December 9th.—James Ferguson,—Miner, Tangier,—Thawing dynamite improperly.
4. December 24th.—Edward Hall—Driver Boy, Lingan—Horse, drawing empty waggon, ran away.

The following notice of the fatal accident at Tangier is from an account furnished by Mr. J. Fraser Torrance, M. E., who was within a few yards at the time:—

“On Tuesday, December 9th, about 10 a. m., Joseph Ferguson, as blacksmith, was engaged in heating a gad at the forge in the Western shaft house on the Fields Lead. His cousin, Jim Ferguson, the deceased, was inserting a capped fuse in a cartridge of No. 1 dynamite. George Ferguson, Sr., who drove their horse, was also in the building, along with Joe Mason and Mr. Logan, a fisherman. A tin dinner can with three cartridges of partly frozen No. 1 dynamite in it, and supposed to contain hot water, was standing on the forge, not far from the fire. Suddenly the explosion occurred. Jim and Joe Ferguson were hurled in a heap into one corner of the house, and Old George also fell in inside. Joe Mason and Logan declare that they themselves were blown bodily through the doorway of the building on to the dump.

“The shaft house was considerably injured by the explosion, but by no means wrecked. And nobody was injured by falling timbers; in fact none fell.

“The dying man lingered apparently unconscious for about half an hour after he was carried home. His wounds were chiefly in the lower part of the body, and *his hands were but slightly injured*, which proves to my mind most positively that the detonator and cartridge in his hands never exploded.

“The probable cause of the accident was the overheating of the can, and its consequent dryness. Such an accident would be practically impossible with one of the patent warming cans for dynamite. Several other cartridges had been removed from the can less than five minutes before the explosion, otherwise all five men would probably have been instantly annihilated. As it was, it is providential that none of them were blown down the open shaft, at the bottom of which their comrades were working. The Coroner's inquest was held that afternoon, and a verdict was returned, simply to the effect that the deceased came to his death by the accidental explosion of dynamite.”—*Mor. Chr.*

The accident at Lingan, December 24th, occurred on the incline from the wharf. The horse drawing up the empty waggons ran away, and the driver, instead of putting on the brake, jumped out. His feet caught in the reins, and he was dragged along the ground for some distance. His injuries were at first considered slight, but proved fatal six days afterwards.

Seven accidents causing injuries more or less serious, were reported as having happened while taking down coal, or from falls of coal and stone in working places.

Taking the average of the last fifteen years, it is found in England that the fatal accidents from this cause form 38.9 per cent. of the total fatal colliery accidents above and below ground.

A colliery manager, of many years experience, recently stated that he had never known a single accident by falls of roof or coal, which was not due, in a great measure, to contributory negligence on the part of the workmen.

The Government Inspector for Yorkshire states that, "men frequently neglect to use the means supplied to them for ensuring their own safety, and prefer to run the risk of injury or death in the endeavor to save time to taking steps to make their working places secure."

In the North of England, where men are specially appointed as "proppers" of the roof, there are but 1.3 lives lost for every 500,000 tons of coal extracted, while in South Wales, where this system is not adopted, the extraction of the same amount of coal was accompanied with a loss of 3.20 lives.

Sir George Elliott stated, in the House of Commons, that the Colliery owners should perform the propping in all districts, and that there would be a greater economy of life and limb by having that urged and insisted upon than by any other measure connected with the Mines' Regulation Act.

Where such a system is adopted, it is but reasonable that the colliers should contribute toward the wages of those men who are employed to enable them to work with increased safety.

By careful timbering, spragging and propping this class of accidents could be reduced at least 50 per cent. To attain such favorable results the collier must contribute his own care and discretion, for it is impossible for any colliery management to watch every working face, with its conditions of shape and safety varying every hour.

Three non-fatal accidents are reported as having occurred from explosives, viz., from returning too soon to a "hang-fire" fuse, unramming a miss-fire; and the third occurred in a stone drift, where the match missed fire. The collier introduced a copper needle to put in another match, when the shot went off, fortunately without inflicting serious injury.

In this connection, the following extract of special rules in force in the Metalliferous Mines district of T. F. Evans, Esq., Inspector of Mines, North Wales, may prove useful:—

"He shall, every time he commences work, or returns to it, after blasting, make a careful examination and remove any loose

ground or rock that may be dangerous. When firing a shot, he shall station himself out of the way, so as to most conveniently warn other persons of the danger. If a shot misses fire, he shall not return to it, or to its neighborhood (except in case of emergency) during that shift, or at soonest, after the lapse of half an hour; and when he does, he shall on no account attempt to re-open the old hole, but shall drill another at a distance of not less than four inches from the old hole, and in such a direction that his drill shall not come in communication with the old charge. If the shot goes off, but fails to do its work, he shall not recharge the hole, nor put powder into any rent made, until after the lapse of 10 minutes."

In this connection the last report of Major Majendie, H. M. S. Chief Inspector of Explosives, contains some information which may be of service to those engaged in mining in this Province.

Out of 28 gunpowder accidents, six appear to have occurred in the process of ramming or unramming a charge. This class of accident is due chiefly to want of care and vigilance on the part of workmen.

Five accidents occurred from deterred action of the fuse, and the Inspector states, "We have been led lately to look more closely into the matter, and it is quite evident that very considerable retardations in the action of safety fuse may arise from more than one cause. Thus, a defect in the manufacture, the presence of oil or damp in the powder column, the kinking or semi-fracture of the fuse in storage or handling, are among the causes of "hang fires." Possibly in some cases they may arise from the miner unintentionally igniting only the yarn of the fuse, which smoulders on until the fire reaches the column of powder (the top of which may have been shaken out of the fuse) and action unexpectedly ensues. But in the majority of cases it is more probable that the interruption occurs after the fuse has actually become ignited, and that the smouldering of the fuse at this point produces hang fire. A simple remedy against any evil consequences is a rule forbidding any miner to approach a fuse which has apparently "missed fire" for an interval of at least half an hour.

Out of nineteen dynamite accidents, four occurred through wilful neglect of the instructions given for the proper process of thawing it.

Two accidents were due to the boring of holes in the neighborhood of holes in which dynamite had been deposited a few days previously, and from which the water had caused the nitro-glycerine to exude. The tools used in boring struck the exuded nitro-glycerine and exploded it.

Eight accidents were due to the miner igniting by his tools part of a charge of dynamite which had remained unexploded by a previous blast.

The teaching of these accidents, the Inspector says, is that in no case should boring be permitted in the vicinity of an old hole, until the place has been carefully searched by a competent person. And in the case of wet holes, all boring in the immediate vicinity, except on a higher level, should if possible be prohibited.

---

## VENTILATION.

Many of the collieries are carefully and systematically ventilated; but I would bring to your notice the fact, that at others, there is shown a want of appreciation of the importance of this subject.

Some of those engaged in conducting collieries, appear to reason that, because fire-damp is present merely in traces, a very slight circulation of air is all that is required. The important fact is lost sight of, that the miner should work in an atmosphere representing as nearly as possible the external air, whereby, not only is a larger amount of coal dug for the master, but the health and life of the workman is better maintained. Therefore, it has frequently happened that in a pit giving off gas and requiring a strong current of air, the miner labors in an atmosphere purer than in many mines almost entirely free from gas.

It is frequently the custom to measure the volume of the ventilating current at the intake or the outlet; it is evident that this affords no guarantee of the proper passage of the air through the workings.

In addition, if the air be measured at the outlet, it will be found to have increased in volume by the heat produced by lamps, men, decomposition, and the natural warmth of the strata.

In one instance a furnace was passing a current of some 18,000 feet, while the air in the working places was almost stagnant. After a while, the air was measured at the intake splits and found to be of insignificant volume; further search showed that the furnace drew its air from a hole that had fallen in from the surface, and that only a small proportion of it passed through the works. Had the mine in question been liable to outbursts of gas, the consequences would have been serious.

Almost every coal mine in the Province has two, and many several ranges of working places. The object of ventilation, is to provide for each of these ranges an adequate amount of fresh air, to keep the road ways fresh, and when necessary, to air abandoned districts. The measurement at the outlet alone, affords no information whether these points have been attended to or not. The measurements of the air actually entering each range, of the roadway scales, and of the air intended for the waste, added together, and compared with the total amount of air leaving the mine, corrected for the temperature of the incoming and outgoing air, will show the quantity lost by defective doors and stoppings, which has been known to amount to one-third of the total ventilating current. Measurements of the air, based on the above general principles, will give information on the air of a mine, which, if acted upon, will not only conduce to the safety and comfort of the miner, but also frequently prove an economy.



Such measurements should be made weekly at least; the mining laws of several of the States of the Union, require returns of such measurements to be made once a month to the Inspector. In this connection, the use of mechanical ventilators will be found especially suitable for our comparatively shallow mines, where an upcast shaft of proper length cannot be readily obtained. The fans of the Guibal and similar patterns are rapidly replacing furnaces in England and the Continent, on the grounds of greater safety, convenience and economy.

Thus, makers in England offer self-contained Guibal fans and engines, F. O. B., at Liverpool, capable of passing 15,000 to 20,000 cubic feet per minute, for \$870; larger ones capable of passing, say 80,000 feet, costing about \$1,100. I would be glad at any time to show plans of fans, etc.

**FIRE DAMP.**—During last summer an interesting series of experiments were made, under the auspices of the Midland Institute of Mining Engineers, by Mr. Smethwick, which shows that the Davy lamp cannot be considered absolutely safe where gas is given off in quantities requiring high ventilating velocities; and that under similar circumstances the Clanny lamp proved but little safer. The Mueseler lamp, which is self-extinguishing, was found to give the best results, as its light was the brightest and steadiest combined with ready indication of the presence of gas.

These results are confirmed by the report of the Belgian Commission which states that, "The whole of the experiments prove that no means of lighting can be absolutely safe. As far as the Davy and Porion lamps are concerned, it has been shown from the beginning that they give no kind of security in an explosive mixture of 1.70m. per second. The Mueseler lamp has generally behaved well, but has produced unaccountable explosions," &c.

The progress made in electric lighting warrant us in anticipating that at no distant date a safe and practical light will be available for shaft bottoms, landings, incline heads, &c., but at present it is not clear that it can be introduced into the numerous working faces of a large mine.

An ingenious method of detecting and measuring the fire damp in mines has been proposed by A. H. Maurice, of Staffordshire, viz.: An air-tight vessel is provided with a vacuum gauge, provision is made for introducing into it another air-tight box, holding spongy platinum, which can be opened without admitting air to the larger box. When the box holding the platinum is opened it decomposes the fire damp in the larger box, producing water and carbonic acid, the consequent rarefaction of the air is recorded on the gauge.

The Mallard Chatellier process for detecting gas consists in replacing the oil flame by a hydrogen jet, which burns with great heat but little flame—owing to latter property of the jet, it keeps any explosive gas in the air burning and at the same time the flame elongates. The blue cap is longer than in an oil lamp and is not obscured by the presence of a white flame. The ordinary glass



chimney is replaced by a copper one, which has an aperture fitted with a magnifying glass to observe the flame. From trials by experts it is claimed that .25 of 1 per cent of gas can be detected.

Herr Keorner, of Freiberg, has devised an improvement in miners's safety-lamps, by constructing the same in such a manner that the entire air-supply which feeds the flame is made to pass into a wire-gauge chamber through a filter of pumice-stone, impregnated with platinum black. The action of this device is based on the property of platinum black to condense on its surfaces such combustible gases as light carbureted hydrogen, and effect their slow combustion.

Whatever may be the utility of this lamp for general pit work, it may be found very useful for driving gassy levels, firemen, etc.

Herr Nasse, from experiments, near Saarbruck, deduces the following opinions:—

“That none of his observations could fix a definite pressure, below which, gas effluxed; although in every case gas appeared only with a falling barometer, and any important continued diminution added to the quantity. Therefore, as there is a greater margin for such decrease, the higher the mercury stands, it is evident that practically a high barometer calls for more caution than a low one.”

Mr. Greenwell, President of the Newcastle Institute of Mining Engineers, made in his inaugural address in April, 1879, the following remarks, which may be read with profit by gentlemen on this side of the Atlantic, who consider themselves safe from explosions, because fire-damp shows in their workings merely in traces, or as an almost inappreciable ingredient in the air:—

“Those who have examined the workings of collieries after explosions have occurred, cannot fail to have been struck by the following facts which are of frequent occurrence:—

1. The large area affected by the fire, frequently including the general workings to a greater or less extent.
2. The very frequent entire absence of explosive atmosphere in any part of the workings, notwithstanding the derangement of the ventilation.
3. The quantity of charred coal dust that is found covering the props and the floors and wall-sides of the drifts and excavations.

“The above certainly lead us to the conclusion that it was not the actual condition of the mine previous to the explosion as regards fire damp, which was the cause of such a wide-spread fire. What part is performed by coal dust and what part by fire-damp, possibly given off with great rapidity during even the short period of the explosion, is at present hidden from us. That coal dust should suddenly be ignited by flame, distilled into gas, and exploded simultaneously over miles of excavations, is not easy to realize, although it may be capable of ocular demonstration that it will do so in a box; it is a case in which I fear laboratory experiments will fail us. We are by no means absolutely certain as to the temperature at which fire-damp will ignite; we know that coal gas will ignite at a much lower one; but have we considered the result from a distillation at a low temperature of that impalpable dust which we have under our notice? Not gas in its purified state,

---

but with all of its highly inflammable adjuncts? And not cool, but at the temperature of distillation? Will this fire at a Davy-lamp, not at but under a red heat? Have we thought whether or not the sudden compression (produced by an explosion) of the loaded atmosphere into the *culs-de-sac* of the workings might produce sufficient heat not only to distil the dust but to ignite the product?"

**SAFETY VALVE.**—The following description of a safety valve recently patented by J. Greener, Esq., Manager of the Vale Colliery, shows that attention is still being given, by those engaged in our mines, to that important problem, safe boiler working:

It consists of a valve chest holding two valves, reversed, one directly over the other, on the same stem, and so arranged that when the lower one is held down in the usual way, a small opening is left between the upper one and its seat. A pipe inserted between the valves leads to the furnace and is so arranged that the fire is damped out by an escape of steam when the upper valve is closed. Should the pressure rise a little above the working pressure, the lower valve opens slightly, not enough to close the upper aperture, and the steam escapes into the air. Should the pressure continue to rise, the lower valve rises more, closes the upper aperture and allows the steam to pass through the pipe into the furnace. The valve lever is similar to that in ordinary use except that it is continued beyond the fulcrum, and has a vertical hole in it. The boiler being fitted with the usual low water indicator weight, it is attached in this instance to a small tube instead of a wire. This tube passes through the hole mentioned and carries a whistle. A hole is cut in the tube, so that when the water falls below the safe working level, the hole comes inside the boiler and allows the steam to escape and sounds the whistle. A stop is placed on the whistle tube so that it strikes the lever when the tube has fallen low enough to allow the whistle to sound. Should the water continue to fall, the indicator weight raises the lever, trees the valve, which rises, closes the upper opening, and the fire is put out by the escape of steam through the pipe above mentioned.

It will appear that a boiler fitted with this valve and alarm can neither be exploded by over-pressure, nor injured by a careless attendant allowing the water to get too low; and the greatest point in its favor is that it requires no more attention than an ordinary safety valve.

**SLACK COAL.**—In view of the large amount of slack coal that accumulates at many of our mines, especially in Cape Breton, the following notes on what is claimed to be a practically successful method of making compressed fuel may not be misplaced:

The manufacture of briquettes in England amounts annually to about 200,000 tons, and has been confined chiefly to South Wales.

Some time ago trials were made of English artificial fuels by the naval authorities, and they were not considered satisfactory, owing to heavy clinker, quantity of smoke, and high price, exceeding that of round coal, the greatest point in their favor

being their adaptability to stand weather, handling and warm climates.

The cost may be chiefly owing to their being made, as coke formerly was, from selected coal. It is now well known that the best of coke is made from washed slack, and this removes that very important objection.

Trials made of the French artificial fuels showed that they gave better results than Cardiff or Newcastle coal, and are now largely used in the navy and mercantile marine of that country.

The fuel works in connection with the Anniche Mines turn out about 250 tons of briquettes daily, and employ 50 hands.

Briquette machines, such as those of Yeadon & Co., Leeds, capable of turning out 60 tons of fuel per day, cost only £1,600, including Cornish boiler, 2 briquette machines, grinding and mixing pans, elevators and hoist, shafts and drums, etc.

The briquettes are evenly compressed and no pitch or expensive adhesive material is used. The cost of making 36,000 4lb. briquettes, or 60 tons of the above, including 20 p. c. for interest and depreciation, is given at 1s. 6d. per ton of 2,240 lbs.

These machines have lately been introduced into the North of England, and are found to work satisfactorily and to give a product which is coming in demand for steam and house use.

For preparing coal for this purpose as well as for coke making, Hart's Pneumatic Mineral Separator is a step in the right direction. In this machine, air is employed instead of water, and is driven, at the rate of 800 pulsations per minute, through the material to be sorted at a pressure corresponding to the order of separation of the minerals according to their densities. The mass rapidly becomes what may be termed semi-fluid, arranging itself in the order of the densities of the minerals contained. It is thus particularly adapted for coal cleaning where the specific gravities of the impurities do not greatly exceed that of the mineral itself. It further avoids the film of clay which is spread over coal when washed by water, and the slack is dry and ready for sale or the ovens.

**EXPLOSIVES.** — During the past year, although no very striking innovations have been made in the various explosives used by the miner, several improvements deserve notice.

In ordinary blasting powder, the experiment has been made of compressing it into cartridges which present the following advantages, viz: saving of weight and bulk, lessened smoke. When used in coal mining a lessened per centage of slack owing, to the action of the powder being slower and more resembling that of a wedge, the holes are more quickly bored and less tamping is required. Trials of this powder in Belgian coal mines are said to show that the better quality of coal produced compensates fully for its increased cost over loose powder.

It is known that gunpowder is frequently found too quick or too slow for purposes required. In order to quicken the action of ordinary gunpowder, Mr. Nobel proposes the admixture of a few per cent. of a powder made of picrate and nitrate of potash.

The Kennal Vale Powder Co. have introduced the ordinary gunpowder compressed into short cylinders with hole in centre. They are strung on fuse, which is cut to required length of charge. These cylinders can be water-proofed, and are said to give quick ignition and less smoke.

The annual reports of the English Inspectors of Explosives contain much valuable information on this subject, and are worthy the perusal of all who are engaged in mining and quarry work.

Interesting experiments have recently been made by the Austrian Government in gelatinous nitro-glycerine. This substance is formed by dissolving glycerine in the latter, and is a gelatinous gummy body which does not part with the nitro-glycerine under the heaviest pressure. It resists water, will not explode from percussion and is with difficulty ignited.

Important qualities are conferred on this explosive by the addition of about 4 per cent. of camphor. It then becomes ignitable only at very high temperatures, is practically unaltered by water, and produces less smoke than dynamite, with a far greater power.

To those engaged in sinking or drifting, who do not wish to use electricity for shot firing, the simultaneous fuse, known as Bickford's, will prove useful. It consists of an ordinary fuse connecting through an explosive disc with any number of instantaneous fuses burning at the rate of 100 feet per minute; thus providing a means of firing shots with almost the same speed and a lessened cost as compared with electricity.

A novel means of breaking down coal has been brought forward by Mr. W. Garford, who has succeeded in compressing air in a portable machine to a pressure of 15,000 lbs. per square inch. This is conveyed to a sheet iron cartridge fitted in a drill hole bored in the coal and there exploded.

Should extended trials prove the applicability of this scheme, a great step will have been gained by doing away with the obnoxious gunpowder fumes.

---

## GOLD MINING.

---

In connection with the large quantities of metallic compounds in the Nova Scotia leads holding gold, it may not be amiss to note that in Victoria the average yield from pyrites and blanketings during 1877, was 2 oz., 10 dwt., 13 grs., per ton; and during the years 1869-78, 2 oz., 10 dwt., 18 grs. These averages have been maintained since, and several new mills built especially for their treatment.

The Committee appointed by the Victoria Government to report on the best method of treating pyrites ores, gave the following summary of their report:—(1.) That it is decidedly better to crush quartz containing pyrites raw. (2.) That the method of

concentration which has given the most satisfaction in this colony is the use of Borlase's buddle with Munday's patent scrapers. (3.) That it is absolutely necessary to roast pyrites previous to amalgamation, and for this purpose reverberatory furnaces with inclined hearths are the best at present in use in the colony. That the introduction of combustible substances with the charge is not advisable, and that attention should be given to the regular supply of fuel and to the proper regulation of the draught. (4.) That for the purpose of amalgamation Wheeler's pans and Chilian mills are both very efficient, but, owing to the inability of the board to obtain analyses of the waste from each description of machine, their comparative saving values cannot be determined. (5.) That the evil effects of the noxious fumes on health and vegetation are not at all great, and can be easily and wholly avoided by the use of water condensers in conjunction with suitable flues and high chimney stacks, and that the water used in condensing be disposed of in the most effectual manner that the local features in each case admit. And (6) that it would be very advantageous if large central works were erected for the thorough treatment of pyrites and the whole of the waste products thereof, and that encouragement should be given by the Government, either by way of bonus or suitable site, to the person or company first establishing such works.

The following arrangement of plates has been found to save an increased percentage of gold in Victoria. The first plate, which is 9 inches wide and runs the length of the stamp box, is placed horizontally and on a level with the grating frame. This plate receives the pulverised quartz directly from the grating, the force of the discharge being sufficient to keep the plate clear, although it is horizontal. The sand, after running over this plate, is conveyed to the second plate pitching toward the box, and passes from it to a narrow plate 4 inches wide, laid on the ledge of the box, from which, after travelling over the ordinary plates and ripples, it is received on a blanket slide. The latter acts in a somewhat similar manner to the first and second copper plates, and is specially intended to catch pyrites and loose mercury.

The arrangement of the first two copper plates, combined with the splash from the grating, forms the basis upon which the merit of the contrivance rests.

The splash forces the sand gently over the first plate to the top of the second one, and as it recedes from the latter it is caught by the succeeding splash, which forces it partly back again, thus checking and moderating its momentum and keeping up a wave-like motion. This is favorable to the deposition of the fine gold, which would otherwise be carried away by the rush of water without coming into contact with the copper plates, owing no doubt to its lightness, a good deal of it being all but imponderable.

The following papers bearing on Nova Scotia Geology and Mineralogy have been published during the past year:—

*Dr. Honeyman.*—Geology, King's County:—Reviews of Nova Scotia Geology. *Nova Scotia Inst. Nat. Science.*

*H. Louis.*—New Mineral (Louisite) from Blomidon:—The Ankerite Veins of Londonderry.—*Ibid.*

*E. Gilpin.*—The Limonite and Limestones of Pictou Co.—*Ibid.* Notes on Nova Scotia Pit Waters:—*North of England Institute of Mining Engineers.*

*H. S. Poole, F. G. S.*—The Gold Veins of Nova Scotia :—*Geological Society of London.*

*Principal Dawson.*—McGill College ; Notes on the Geology of Nova Scotia :—*Canadian Naturalist.*

I have the honor to be Sir,

Your obedient Servant,

EDWIN GILPIN, JR.

*Inspector of Mines.*



LIST OF MINERAL LEASES (OTHER THAN COAL.)

No.	LESSEE.	DISTRICT.	Area Sq. Miles.
2	COPPER.		
	ANTIGONISH Co.		1
	Ross, Sarah, and others.....		
	COLCHESTER Co.		
	Moir, Wm. C. et al.....	Tatamagouche.....	10½
	LEAD.		
	HALIFAX Co.		
1	McClure, Charles F .....	Gay's River.....	1
	IRON.		
	PICTOU Co.		
35	Carmichael, John R. ....	East River.....	1
32, 33, 34, 36, 37, 38, 40, 41	Hamilton, John and others.....	" .....	9
39	Hudson, James.....	" .....	1
	CAPE BRETON Co.		
86	Brookman, S. J. et al.....	N. Side East Bay.....	1
91	Brookman, Phœbe.....	East Bay.....	1
84	Protheroe, Pryse.....	Cow Bay.....	1
	INVERNESS Co.		
16	Inverness C. I. & R. Co.....	Whcocomagh.....	1

Total Area under lease.....27½ square miles.

## LIST OF COAL LEASES.

No.	LESSEE.	COLLIERY.	Area Sq. Miles.	WORKING.	AGENT AND Manager.	POSTAL ADDRESS
1	McKcKinnon, et al.....	ANTIGONISH Co. .....	3			
		CUMBERLAND Co.				
44	Baker, John W.....	.....	1			
13, 14, 15	Black, C. H. M.....	.....	3			
21	Blight, James, et al.....	.....	1			
47	Boston, C. M. Co.....	.....	1		John Moffat.....	River Hebert
25	Campbell, Alex., et. al.....	.....	1			
32, 34	Campbell, Alex., et. al.....	.....	2			
35, 48, 49, 50	Campbell, Alex.....	.....	4			
31, 33, 37, 38, 40, 41, 45, 46,	Campbell, John.....	.....	8			
12	Cumberland, C. M. Co.....	.....	4			
17	Domville, James.....	.....	3		E. N. Sharp .....	St. John, N.B.
	Joggins, C. M. Association....	Joggins .....	2	working.	{ B. B. Barnhill... Robert Redpath..	Joggins.
20	Joggins, C. M. Co.....	Cumberland .....	2			
18, 19	Kirby, Lewis R.....	.....	1			
5	Livesey, John .....	.....	2			
42	Lawson, C. M. Association....	Maccan .....	1			
51	Macfarlane, Alex .....	.....	1			
1, 2, 3, 4	Milner, Christopher .....	.....	71			
	New York & Acadia Co .....	Scotia .....	4	working.	William Bennett..	Maccan.



43	Pugwash & Spring Hill R. Co.	.....	1	working.	William Hall....	Spring Hill.
16	Seaman, Gilbert.....	.....	1		" "	" "
24	Shannon, S. L.....	.....	2		J. S. Hickman....	Amherst.
36, 39	Shannon, S. L., (in-trust) et al	.....	2			
6, 7, 8	Spring Hill Mining Co.....	Spring Hill.....	3			
52	" " " " " " " "	" " " " " " " "	4			
22, 23, 28, 29, 30	Styles Mining Co. (Limited).	.....	5			
9	Victoria Coal Mining Co.....	.....	2			
26, 27	Wright, John V.....	.....	3			
		Pictou Co.	65			
1	Acadia Coal Co.....	Fraser.....	1			
3	" " " " " " " "	Acadia.....	1	working.	H. S. Poole .... }	Stellarton.
42	" " " " " " " "	Pictou.....	4		J. Macwell .... }	Westville.
23	Allan, Sir Hugh, Kt.....	Vale.....	3	working.	{ J. B. Moore .... }	"
10	Gray, B. G.....	.....	1		{ John Greener .. }	New Glasgow.
11	Haliburton, R. G., et al.....	.....	1			Vale Colliery.
	Halifax Company, (Limited).	Albion.....	4		{ S. Cunard & Co.	Halifax.
13, 14	Intercolonial Company.....	.....	2		{ James Hudson.. }	Stellarton.
12	" " " " " " " "	Drummond.....	1	working.	Robert Simpson ..	Westville.
6	Kirby, Lewis R.....	.....	1			
15, 30, 31	Merigomish Company.....	.....	3			
25	Nova Scotia Company.....	Black Diamond....	4			
20	Price, D. E., et al.....	.....	2		W. W. White ....	Westville.
24	Richey, M. H.....	.....	1			
			29			



38, 39	Gen'l Mining Ass'n (sea areas)	Lingan.....	10			
10, 21	Gibson, John, et al.....	.....	2		{ E. P. Archbold .	Halifax.
4, 12, 16	Glace Bay Mining Co.....	Glace Bay.....	3	working.	{ Henry Mitchell.	Little Glace
75	Henry, W. A.....	.....	1			
22	Ingraham, R. J. and J. L.....	Halfway.....	1			
6, 13, 18, 19	International C. & R. Co.....	International.....	4	working.	{ R. Belloni.....	Cow Bay.
71	Jennings, Edward.....	.....	1		{ P. Johnstone..	Bridgeport.
47	LeCras & McInnes.....	.....	1			
66	Merchant's Bank of Canada.....	Gardener.....	2			
74	Moore & Moseley.....	.....	14			
81	Morton, Lemuel J.....	.....	1			
80	McDonald, James.....	.....	1			
52, 53	McLeod .....	.....	2			
88, 89, 90	Paint, J .....	.....	3			
83, 85	Prother .....	.....	2			
73, 82	Reid, Thos. S., (sea area).....	.....	2			
40, 41, 42	Ross, H. E., et al.....	.....	3			
79	Ross, W. J., et al. (sea area).....	.....	1			
43	South Head Coal Co.....	South Head.....	1			
32	Sword, Wm., (sea area).....	.....	3			
54 to 63	Sydney C. M. Co., (sea areas).....	.....	10			
46	Todd, A. Thornton.....	Collins.....	1		George Scott.....	Little Bras d'Or.
67	Weatherbe & Kirby.....	.....	1			
78	Weatherbe, R. L., (sea area).....	.....	5			
34, 35, 36	Victoria C. M. C., (sea area).....	Victoria .....	5			
50, 51	" .....	.....	2			
			1304			

## LIST OF COAL LEASES.—Continued.

No.	LESSEE.	COLLIERY.	Address.
		INVERNESS	Cove.
5	Aylmer, John Evans Freke...	Cape Mabou.	
8	Evans, Thomas.....	Chimney Corri	
9	Evans, Thomas ( <i>sea area</i> )....	.....	
7, 12	Inverness C. I. & R. Co.....	.....	
18	Murray, George.....	Port Hood ..	
4	Richey, M. H., et al.....	.....	
11	Ross, W. J.....	Broad Cove..	
6	Ross, H. E., et al, ( <i>sea area</i> )....	.....	
14, 15	Smyth, Peter.....	.....	
10	Tremain, E. D., ( <i>sea area</i> )....	.....	
		RICHMOND	
2	Marmaud, A. E.....	Little River .	
		VICTORIA CO.	
2	Campbell, Chas. J .....	New Campbellton.	N. Campbellton.
8, 4, 5	Ross, William.....	Black Rock.....	
		1	3 working, John McDonald ..
		5	
		8	
Total area under lease.....			253½ square miles.

COAL TRADE BY COUNTIES.

TABLE A.

	CUMBERLAND.		PICTOU.		CAPE BRETON.		OTHER COUNTIES.		TOTAL.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter .....	16,604	15,029	68,012	38,837	16,910	4,222	.....	35	101,526	58,123
2nd Quarter.....	23,210	20,104	97,181	80,657	70,717	62,297	831	450	191,939	163,508
3rd Quarter.....	24,664	22,943	137,486	128,062	106,560	107,075	1,803	1,737	270,513	259,817
4th Quarter.....	34,744	32,595	85,807	83,322	101,797	89,330	1,945	1,929	224,295	207,176
Total .....	99,222	90,671	388,486	330,878	295,984	262,924	4,579	4,151	788,271	688,624
1878.....	113,873	104,869	315,395	288,403	340,056	299,055	1,279	1,184	770,603	693,511
1877.....	107,004	99,078	306,477	284,155	340,416	301,981	3,599	1,851	757,496	687,065
1876.....	93,232	84,528	306,390	275,618	304,102	268,808	5,922	5,253	709,046	634,207

## COAL TRADE BY COUNTIES.

TABLE B.

	CUMBERLAND.		PICTOU.		CAPE BRETON.		OTHER COUNTIES.		TOTAL.		GRAND TOTAL.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	
Nova Scotia—											
Land Sales.....	12,092	7,029	67,084	38,498	1,167	5,201	41	.....	80,384	51,728	131,112
Sea-borne.....	.....	.....	52,673	10,051	79,889	2,772	1,523	.....	134,185	12,823	147,008
Nova Scotia—Total.	12,092	7,029	119,757	48,549	81,156	7,973	1,564	.....	214,579	63,551	278,120
Quebec.....	8,727	117	102,612	605	41,342	68	647	.....	153,328	790	154,118
New Brunswick...	50,971	11,735	3,011	1,315	17,058	81	560	.....	71,600	13,131	84,731
Newfoundland.....	.....	.....	98	.....	56,246	170	1,137	.....	57,481	170	57,651
P. E. Island.....	.....	.....	13,793	24,303	5,793	754	243	.....	19,829	25,062	44,891
United States.....	.....	.....	15,165	432	25,461	10,583	.....	.....	40,626	11,015	51,641
West Indies.....	.....	.....	815	.....	9,309	.....	.....	.....	10,124	.....	10,124
Europe.....	.....	.....	423	.....	6,925	.....	.....	.....	7,348	.....	7,348
Total .....	717,90	18,881	255,674	75,204	243,290	19,664	4,151	.....	574,905	113,719	688,624
1878.....	84,244	20,625	198,641	89,762	277,914	21,141	1,184	.....	561,983	131,528	693,511
1877 .....	81,644	17,434	211,707	72,448	282,710	19,271	1,849	2	576,910	109,155	687,065
1876 .....	68,377	16,151	217,530	58,088	247,001	21,807	5,121	132	538,029	96,178	634,207

## COAL.—SALES.

MARKETS.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1879.	1878.
Nova Scotia.						
Land Sales...	44,456	25,775	21,189	39,692	131,112	142,856
Sea-borne ....	1,669	34,050	50,049	61,240	147,008	137,316
N. Scotia—Total	46,125	59,825	71,238	100,932	278,120	279,172
Quebec .....	464	45,659	85,479	22,516	154,118	83,710
New Brunswick	9,890	18,175	25,069	31,597	84,731	115,245
Newfoundland .	.....	13,534	23,115	21,002	57,651	61,361
P. E. Island...	.....	8,361	22,403	14,127	44,891	43,412
United States...	1,081	13,872	27,946	8,742	51,641	88,495
West Indies....	361	3,912	2,291	3,560	10,124	16,999
S. America.....	.....	.....	.....	.....	.....	523
Europe .....	202	170	2,276	4,700	7,348	3,594
Total .....	58,123	163,508	259,817	207,176	688,624	693,511
1878 .....	65,516	173,929	271,279	182,787	693,511	693,511
1877 .....	47,843	146,079	290,789	202,354	687,065	687,065

## COAL.—GENERAL STATEMENT.

1879.	Produce.	Sales.	Colliery Consumption.
1st Quarter.....Tons	101,526	58,123	20,511
2nd Quarter.....“	191,939	162,508	20,955
3rd Quarter.....“	270,513	259,817	20,481
4th Quarter.....“	224,293	207,176	22,840
Total .....	788,271	688,624	84,787
1878.....	770,603	693,511	88,627
1877 .....	757,496	687,065	98,841
1876 .....	709,646	634,207	113,788

COAL PRODUCE OF NOVA SCOTIA DURING THE YEAR ENDED DECEMBER 31ST 1879.

MINES REPORT.

COLLIERIES.	SEAMS.	Produce.	SALES.			COLLIERY CONSUMPTION.			
			Bearing Royalty.	Free.	Total.	Per Centage.	Engines.	Workmen.	Per Centage
CUMBERLAND COUNTY.									
Joggins .....	Joggins Main .....	9,061	7,145	914	8,059	88	885	130	11
Scotia .....	North Seam .....	710	832	185	1,017	..	50	.....	7
Spring Hill .....	Black .....	88,405	62,842	17,614	80,456	91	5,365	1,623	7
Chignecto .....	North Seam .....	914	871	168	1,039	..	.....	.....	...
Milner .....	.....	132	.....	.....	.....	..	.....	.....	...
PICTOU COUNTY.									
Acadia .....	Acadia .....	87,750	56,104	21,206	77,310	88	5,299	1,579	7
Albion Mines .....	Main .....	171,534	96,927	34,493	131,420	76	15,060	3,824	11
Intercolonial .....	Acadia .....	85,017	70,593	14,077	84,670	99	2,550	1,260	4
Vale .....	McBean .....	44,185	32,050	5,427	37,477	84	3,617	1,127	15
CAPE BRETON COUNTY.									
Block House .....	Block House .....	27,509	21,164	2,355	23,519	85	2,440	1,715	15
Caledonia .....	Phelan .....	14,927	11,622	1,762	13,384	89	537	574	7
Glace Bay .....	Harbor .....	22,947	23,064	215	23,279	...	2,713	986	16
Gowrie .....	McAulay .....	21,735	25,658	5,584	31,242	...	786	2,270	14
International .....	Harbor .....	25,425	21,066	457	21,523	84	1,527	715	8
Lingan .....	Lingan .....	12,957	9,484	736	10,220	78	1,779	653	18
Ontario .....	Phelan .....	14,820	12,975	1,357	14,332	96	372	660	6
Reserve .....	Phelan .....	20,886	15,081	2,188	17,269	82	2,207	917	14
Sydney Mines .....	Main .....	134,778	103,277	4,982	108,259	82	16,183	6,241	16
INVERNESS COUNTY.									
Broad Cove .....	.....	673	671	.....	671	99	49	23	10
VICTORIA COUNTY.									
New Campbellton .....	.....	3,906	3,480	.....	3,480	89	80	127	5
		788,271	574,906	113,720	688,624	.....	61,499	24,424	.....



Statement of the Number and Classes of Persons employed, and average results at each Colliery during the year ended December 31, 1879.

COLLIERIES.	Underground.				Surface.				Construction.		Total.		Average No. of days per person		Average tons per Cutter.	Average quantity raised per day—Tons.	Horses.		Pits Worked.
	Cutters.	Laborers.	Boys.	Days Labor.	Mechanics.	Laborers.	Boys.	Days Labor.	Persons.	Days Labor.	Persons.	Underground.	Surface.	Above.			Below.		
Chignecto .... Cumberland	3	1	..	806	..	1	1	468	..	....	6	1,284	204	234	305	....	1	..	.....
Joggins .....	22	2	6	6,031	8	6	4	8,864	1	134	47	15,029	200	50	414	60	5	1	149
Spring Hill ...	147	43	48	49,185	24	46	10	15,628	6	1,051	324	65,864	176	194	601	429	16	44	206
Scotia .....	4	..	..	594	..	1	1	290	..	....	6	884	148	146	177	....	2	..	....
Acadia, .....	105	22	18	34,913	25	43	2	18,406	..	....	215	53,319	240	262	835	341	7	4	257
Albion Mines.....	259	41	84	85,968	39	124	37	52,881	..	....	584	138,849	224	264	662	568	17	38	302
International .....	95	48	27	35,318	28	38	7	20,894	2	213	245	56,425	235	281	895	403	6	5	211
Vale. ....	110	24	9	26,649	21	22	5	15,525	..	....	191	42,174	186	300	401	363	6	7	121
Block House, ..... C. B.	76	8	39	10,717	21	24	4	10,234	..	....	172	20,951	86	208	361	410	12	28	67
Caledonia.....	27	3	4	5,420	9	10	2	3,969	..	....	55	9,389	160	188	552	165	6	5	90
Glace Bay.....	53	1	7	8,610	19	8	5	7,834	..	....	92	16,444	141	244	433	121	3	2	189
Gowrie .....	68	9	24	12,724	9	23	13	7,665	7	870	153	21,259	127	164	319	215	15	14	101
International .....	50	6	16	10,194	13	24	4	7,420	..	....	118	17,614	141	181	508	276	3	9	92
Lingah.....	32	8	12	6,009	3	17	7	5,523	3	205	77	11,737	128	190	405	182	6	6	71
Ontario .....	34	6	1	6,683	8	24	2	5,619	..	....	75	12,302	163	165	485	77	3	2	192
Reserve .....	54	2	9	7,178	6	6	2	2,516	..	....	79	9,694	110	180	386	181	1	6	115
Sydney Mines .....	231	31	73	71,056	66	95	31	51,185	34	9,078	561	131,319	212	268	586	526	10	23	256
New Campbellton..... Vic.	16	8	3	3,966	3	6	3	2,099	..	.....	89	6,065	147	169	244	19	2	0	135
	1,386	258	880	382,041	302	516	139	237,020	53	11,551	3,034	630,602	188	206	502	271	121	194	151

## COLLIERY CONSTRUCTION ACCOUNT, 1879.

COLLIERIES.	Shafts.	Slopes.	Adits.	Machinery.	Colliery Buildings.	Dwellings.	Surface Works.	Railways.	Wharves.	Prospect'g.	TOTAL.
<b>CUMBERLAND Co.</b>											
Joggins.....	.....	.....	.....	400.00	.....	.....	.....	.....	.....	.....	400.00
Chignecto.....	.....	.....	.....	.....	.....	.....	.....	500.00	.....	.....	500.00
Scotia.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spring Hill.....	.....	.....	.....	.....	624.00	3,000.00	675.00	444.73	.....	.....	4743.73
<b>Pictou Co.</b>											
Acadia.....	.....	2,709.83	.....	100.00	372.49	.....	17.34	.....	3,996.85	.....	7,196.51
Albion Mines.....	.....	.....	.....	370.47	46.41	.....	4,088.15	.....	.....	.....	4,505.03
Intercolonial.....	.....	.....	1,750.87	1,164.68	678.98	.....	.....	833.94	.....	.....	4,428.47
Vale.....	.....	1,580.00	.....	.....	.....	.....	.....	.....	.....	.....	1,580.00
<b>CAPE BRETON Co.</b>											
Block House.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Caledonia.....	.....	.....	137.00	.....	.....	.....	.....	.....	.....	.....	137.00
Glace Bay.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gowrie.....	.....	.....	423.00	.....	.....	.....	.....	.....	3,800.00	.....	4,223.00
International.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lingan.....	.....	.....	92.00	335.00	.....	.....	.....	.....	.....	.....	427.00
Ontario.....	.....	.....	367.00	.....	300.00	35.00	.....	200.00	.....	.....	902.00
Reserve.....	.....	.....	445.30	.....	.....	.....	.....	.....	.....	.....	445.30
Sydney Mines.....	.....	.....	.....	4,567.91	.....	771.63	4,412.89	.....	631.18	.....	10,383.11
<b>INVERNESS Co.</b>											
Broad Cove.....	.....	384.24	.....	1,082.27	233.20	.....	828.63	120.57	29.60	.....	2,683.51
H. McDonald Lease.....	.....	.....	36.00	.....	.....	.....	.....	.....	.....	227.43	263.43
<b>VICTORIA Co.</b>											
New Campbellton.....	.....	.....	500.00	.....	.....	.....	.....	.....	.....	.....	500.00
		<u>\$4,674.07</u>	<u>\$3,751.17</u>	<u>\$8,020.33</u>	<u>\$2,260.08</u>	<u>\$3,806.63</u>	<u>\$10,021.51</u>	<u>\$2,099.24</u>	<u>\$8,457.63</u>	<u>\$227.43</u>	<u>\$43,318.09</u>

*COAL SALES in Nova Scotia from 1785 to 1879, (Inclusive.)*

YEAR.	SALES.	TOTAL.	YEAR.	SALES.	TOTAL.
1785	1,668	14,349	1831	37,170	839,981
1786	2,000		1832	50,396	
1787	10,681		1833	64,743	
1788			1834	50,813	
1789			1835	56,434	
1790			1836	107,593	
1791	2,670		1837	118,942	
1792	2,143	1838	106,730		
1793	1,926	1839	145,962		
1794	4,405	1840	101,198		
1795	5,320	51,048	1841	148,298	1,533,798
1796	5,219		1842	129,708	
1797	6,039		1843	105,161	
1798	5,948		1844	108,482	
1799	8,947		1845	150,674	
1800	8,401		1846	147,506	
			1847	201,650	
			1848	187,643	
			1849	174,592	
			1850	180,084	
1801	5,775	70,452	1851	153,499	2,399,829
1802	7,769		1852	189,076	
1803	6,601		1853	217,426	
1804	5,976		1854	234,312	
1805	10,130		1855	238,215	
1806	4,938		1856	253,492	
1807	5,119		1857	294,198	
1808	6,616		1858	226,725	
1809	8,919		1859	270,293	
1810	8,609		1860	322,593	
1811	8,516	91,527	1861	326,429	4,927,339
1812	9,570		1862	395,637	
1813	9,744		1863	429,351	
1814	9,866		1864	576,935	
1815	9,336		1865	635,586	
1816	8,619		1866	558,520	
1817	9,284		1867	471,185	
1818	7,920		1868	458,624	
1819	8,692		1869	511,795	
1820	9,980		1870	568,277	
1821	11,888	140,820	1871	596,418	6,422,769
1822	7,512		1872	785,914	
1823	27,000		1873	881,106	
1824			1874	749,127	
1825			1875	706,795	
1826			1876	634,207	
1827	12,600		1877	697,065	
1828	12,149		1878	693,511	
1829	20,967		1879	688,626	
1830	21,935				
	27,269				

**SUMMARY.**

1785 to 1790	14,349	1831 to 1840	839,981
1791 " 1800	51,048	1841 " 1850	1,533,798
1801 " 1810	70,452	1851 " 1860	2,399,829
1811 " 1820	91,527	1861 " 1870	4,927,339
1821 " 1830	140,820	1871 " 1879	6,422,769

*Nova Scotia exported to the United States.*  
COAL.

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	98,173	24 ad.	1866	404,252	\$1.25
1851	116,274	"	1867	338,492	"
1852	87,542	"	1868	228,132	"
1853	120,764	"	1869	257,485	"
1854	139,125	Free.	1870	168,180	"
1855	103,222	"	1871	165,431	"
1856	126,152	"	1872	154,092	.75
1857	123,335	"	1873	264,760	"
1858	186,743	"	1874	138,335	"
1859	122,720	"	1875	89,746	"
1860	149,289	"	1876	71,634	"
1861	204,457	"	1877	118,216	"
1862	192,612	"	1878	88,495	"
1863	282,775	"	1879	51,641	
1864	347,594	"			
1865	465,194	"			

NOTE.—The quantities given for the Years 1850 to 1872 are on the authority of the Board of Trade, Philadelphia, and are probably underestimated. At least, the figures given by the Board of Trade for the year 1873, the only year available for comparison with the comprehensive tables now published by this Department, are 12 per cent. below those given in the above table.—H. S. P.

# GOLD.

## GENERAL STATEMENT FOR THE YEAR 1879.

*Shewing the number of Mines at work, days' labour performed, quantity of Quartz, &c., crushed, yield of Gold, &c., &c., for the Twelve Months ended December 31st.*

DISTRICTS.	Number of Mines.	Days' Labour.	Mills employed.	Steam Power.	Water Power.	Quartz, &c., Crushed.	Yield per Ton.		Maximum yield per Ton.		Total yield of Gold.		Average yield per man per day for twelve months, at \$18.00 per oz.
							Oz.	Dwt. Gr.	Oz.	Dwt. Gr.	Oz.	Dwt. Gr.	
Caribou.....	5	7,648	3	3	...	781	0	17	4	0	676	1	\$1.60
Gay's River.....	1	1,031	1	...	1	100	0	8	...	15	41	0	.71
Montague.....	2	4,483	3	3	...	485	3	3	6	13	1,527	10	6.13
Oldham.....	2	5,322	2	1	1	1,787	0	17	11	2	1,600	17	5.41
Renfrew,.....	1	734	1	...	1	419	0	5	0	12	104	1	2.64
Sherbrooke.....	16	44,965	7	4	3	9,209	0	16	17	12	7,389	17	2.97
Stormont.....	1	3,447	...	...	...	124	1	11	2	1	198	15	1.03
Tangier.....	4	9,267	3	1	2	1,454	0	10	3	0	857	7	1.66
Uniacke.....	3	7,775	2	2	...	744	1	1	3	5	787	18	1.82
Waverley.....	2	2,922	2	1	1	442	0	5	1	8	116	11	.71
Wine Harbor.....	1	3,166	2	1	1	424	1	0	9	5	427	5	2.40
Unproclaimed, &c.....	2	1,242	2	...	2	57	1	6	19	18	74	2	1.00
	40	92,002	28	16	12	15,936	0	17	19	18	13,801	8	2.34

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

MONTH.	CARIBOU.							GAY'S RIVER.							MONTAGU.						
	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January.....	7	786	30	45	77	5	8	2	178	6	22	9	7	7	1	36	2	..	..	..	..
February...	7	785	30	46	0	0	..	2	190	8	28	21	8	11	1	26	1	7	4	0	20
March.....	6	654	25	46	35	17	..	2	165	6	1	0	4	00	1	58	2	0	..	..	..
April.....	8	407	15	90	53	13	6	..	...	..	..	..	..	..	1	51	2	10	5	5	15
May.....	7	618	23	123	94	5	19	1	113	4	28	3	12	22	2	145	5	..	..	..	..
June.....	4	646	24	57	46	19	10	1	50	2	..	..	..	..	2	291	10	80	142	13	5
July.....	6	902	34	67	46	9	0	1	80	3	8	1	11	15	3	426	16	50	84	13	10
August.....	4	581	22	0	0	0	0	1	78	3	8	1	19	0	5	701	27	82	364	17	15
September...	5	797	30	53	63	5	0	1	77	3	5	2	16	7	5	917	38	95	432	10	0
October.....	3	522	20	22	28	10	4	1	48	2	..	..	..	11	2	655	25	72	220	9	18
November...	4	399	15	87	89	17	13	1	52	2	..	..	..	..	2	506	19	15	26	11	9
December...	6	541	21	145	139	18	13	..	...	..	..	..	..	..	2	671	26	74	246	9	0
	5	7,648	....	781	676	1	21	1	1,031	....	100	41	0	1	2	4,483	....	485	1,527	10	20

MONTHLY STATEMENT FROM EACH GOLD DISTRICT—(Continued.)

MONTH.	OLDHAM.							RENFREW.							SHERBROOKE.						
	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January .....	2	293	11	99	56	6	14	..	...	..	53	16	1	18	16	3,614	139	782	492	0	20
February.....	2	301	12	96	75	2	13	..	...	..	..	..	..	..	18	3,536	136	849	489	15	0
March .....	2	423	16	87	56	5	1	..	...	..	25	2	15	0	16	3,432	132	892	495	19	0
April .....	1	259	9	145	119	9	16	..	...	..	45	12	5	2	16	3,536	136	622	472	15	0
May .....	2	378	14	184	215	18	0	..	...	..	16	4	11	0	15	3,600	138	628	548	14	12
June .....	2	526	20	164	155	17	10	..	...	..	52	14	10	0	16	4,100	158	907	1,005	8	1
July.....	3	663	25	76	90	11	13	1	200	7	37	7	10	0	16	3,900	150	477	779	19	0
August .....	1	172	6	123	30	5	16	2	36	2	16	3	1	0	15	3,700	142	771	816	12	0
September....	2	374	14	186	185	17	8	2	150	6	54	8	4	0	18	3,848	147	1,040	712	3	12
October .....	3	486	18	116	86	1	23	1	78	2	23	6	10	0	15	4,021	154	611	437	18	0
November....	4	876	33	243	442	4	19	2	135	5	43	9	11	0	15	3,720	146	951	649	7	18
December ....	3	571	22	268	86	16	11	2	135	5	55	19	3	0	14	4,158	159	674	489	5	0
-	2	5,322	..	1,787	1,600	17	0	1	734	...	419	104	-	1	20	44,965	....	9,209	7,389	17	15

## MINES REPORT.

## MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(Continued.)

MONTH.	STORMONT.							TANGIER.							UNIACKE.						
	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	
January .....	1	267	10	...	...	...	...	5	849	32	199	89	8	18	1	36	1	6	2	4	0
February ....	1	245	9	...	...	...	...	5	906	34	107	60	16	21	3	512	20	60	46	17	0
March .....	1	334	12	...	...	...	...	5	2,088	80	226	124	7	3	2	338	12	40	62	7	0
April .....	1	274	10	...	...	...	...	3	283	10	12	3	19	11	3	751	24	57	82	11	0
May .....	1	115	9	47	81	10	0	4	478	18	257	231	7	1	3	519	20	88	29	3	0
June .....	1	280	10	...	...	...	...	4	538	20	56	34	12	16	4	776	29	64	131	11	0
July .....	1	391	14	...	...	...	...	3	417	16	50	52	7	6	3	340	12	36	29	2	0
August .....	1	351	12	...	...	...	...	3	417	16	71	24	0	14	3	1,290	50	103	126	6	0
September...	1	284	10	34	71	5	0	3	1,239	27	145	66	11	12	3	252	9	43	22	4	0
October .....	1	314	17	...	...	...	...	4	617	23	98	50	3	22	4	972	37	97	77	10	0
November...	1	369	18	...	...	...	...	4	415	16	172	72	19	17	3	784	30	87	94	7	0
December ...	1	223	9	43	46	0	0	5	1,120	43	81	46	12	3	5	1,205	46	63	83	16	0
	1	3,447	....	124	198	15	0	4	9,267	....	1,464	857	7	12	3	7,775	....	744	787	18	0



MONTHLY STATEMENT FROM EACH GOLD DISTRICT—(Continued.)

MONTH.	WAVERLEY.							WINE HARBOR.							UNPROCLAIMED, &c.						
	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January.....	1	184	7	40	17	8	0	0	...	...	...	...	...	...	1	13	1	2	...	...	...
February....	1	174	6	85	17	18	0	0	...	...	...	...	...	...	1	14	1	2	...	...	5
March.....	2	270	10	83	8	8	0	0	...	...	...	...	...	...	...	...	...	...	...	...	...
April.....	3	286	11	47	9	9	19	2	347	12	29	134	6	12	...	...	...	...	...	...	...
May.....	2	163	6	39	8	8	8	2	385	13	14	9	14	0	...	...	...	...	...	...	...
June.....	...	...	...	...	...	...	...	1	343	10	...	...	...	...	1	4	1	4	...	...	6
July.....	2	270	10	62	17	4	0	2	302	11	87	120	11	12	4	243	9	8	...	...	0
August.....	2	310	12	9	2	10	0	2	341	12	60	48	12	0	5	335	12	7	14	4	0
September...	2	383	14	12	8	15	0	2	340	12	42	19	11	0	5	311	11	15	13	8	20
October.....	3	382	14	18	9	11	0	2	710	27	...	...	...	...	2	70	2	5	3	16	0
November...	3	198	7	34	12	14	22	2	353	13	139	17	8	0	3	120	4	16	39	5	15
December....	3	302	10	13	4	4	0	1	45	2	53	24	2	6	1	146	5	...	...	...	...
	2	2,922	...	442	116	11	1	1	3,166	...	424	427	5	6	2	1,242	...	57	74	2	22

## GOLD.

### GENERAL ANNUAL SUMMARY.

Year.	Total ounces of Gold extracted.			Stuff Crushed.	Yield per Ton of 2000 lbs.			Total days' Labor.	Average earnings per man per day and year, at 300 working days, \$18 per oz.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		A Day.	A Year
1862	7,275			6,473	1	2	11	156,000	\$ .83	\$249
1863	14,001	14	17	17,002		16	11	273,624	.92	276
1864	20,022	18	13	21,434		18	16	252,720	1.42	426
1865	25,454	4	8	24,423	1	0	20	212,966	2.15	645
1866	25,204	13	2	32,161		15	2	211,796	2 14	642
1867	27,314	11	11	31,386		17	9	218,894	2.24	672
1868	20,541	6	10	32,262		12	17	241,462	1.53	459
1869	17,868	0	19	35,147		10	4	210,938	1.52	456
1870	19,866	5	5	30,829		12	21	173,680	2.05	615
1871	19,227	7	4	30,791		12	11	162,994	2 12	635
1872	13,094	17	6	17,093		15	7	112,476	2.09	627
1873	11,852	7	19	17,708		13	9	93,470	2.28	684
1874	9,140	13	9	13,844		13	5	77,246	2.12	636
1875	11,208	14	19	14,810		15	4	91,698	2.20	660
1876	12,038	13	18	15,490		15	13	111,304	1.94	582
1877	16,882	6	1	17,369		19	10	123,565	2.46	738
1878	12,577	1	22	17,990		13	23	110,422	2.05	615
1879	13,801	8	10	15,936		17	8	92,002	2.34	732
Total.	297,372	5	1	382,148				292,725		

## DISTRICT SUMMARY.

### CARIBOU.

Year.	Total ounces of Gold extracted			Quartz Crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwts at \$0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwts.	
1869	1,001	0	23	1,583		12	17	11,076	1.80	\$1.62
1870	613	11	2	755		16	6	6,500	1.88	1.64
1871	504	15	23	479	1	1	1	2,964	3.40	3.06
1872	209	15	0	368		11	9	2,184	1.92	1.72
1873	17	16	12	21		16	23	312	1.14	1.02
1874	368	10	23	333	1	2	3	4,651	1.53	1.42
1875	446	12	19	368	1	4	6	3,675	2.43	2.18
1876	727	4	10	542	1	6	11	6,000	2.39	2.15
1877	2,596	13	23	1,735	1	9	21	14,579	3.56	3.20
1878	1,026	12	16	928	1	2	2	9,188	2.23	2.01
1879	676	1	21	781		17	7	7,648	1.77	1.60

## MINES REPORT.

47

## MONTAGUE.

Year.	Total ounces of Gold extracted			Stuff Crushed	Yield per Ton of 2000 lbs.			Total days' labor.	Average yield per man per day in dwt. at \$0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwts.	\$
1863	336	14	16	140	2	16	2	38,688	.18	.16
1864	1,052	19	14	545	1	18	15	11,492	1.83	1.64
1865	902	12	23	615	1	9	8	12,376	1.45	1.30
1866	496	15	10	382	1	6	0	6,032	1.64	1.47
1867	436	15	16	244	1	15	11	7,826	1.11	.99
1868	584	14	22	350	1	13	0	7,384	1.58	1.42
1869	805	13	14	572	1	8	3	8,944	1.80	1.62
1870	3,831	9	5	916	4	3	14	15,106	5.06	4.55
1871	3,152	8	15	848	3	14	8	15,938	3.95	3.55
1872	1,793	10	6	683	2	12	12	13,832	2.59	2.33
1873	1,440	3	9	679	2	2	9	10,972	3.62	2.35
1874	655	0	22	496	1	6	10	5,452	2.40	2.16
1875	287	18	17	72	3	19	23	2,526	2.27	2.05
1876	149	1	17	81	1	16	19	1,404	2.83	2.38
1877	50	1	9	55		18	5	1,405	.71	.64
1878	158	6	12	192		16	12	2,065	1.53	1.37
1879	1,527	10	20	485	3	3	0	4,483	6.81	6.13

## OLDHAM.

1862	51	0	0	84	12	3	4,368	.23	\$ .20	
1863	1,223	3	21	1,026	1	4	6	25,896	.94	.84
1864	1,750	5	12	2,238	15	11	37,934	.94	.84	
1865	1,126	11	20	2,236	10	1	18,278	1.23	1.10	
1866	956	12	20	966	19	19	11,362	1.68	1.51	
1867	1,100	3	14	870	1	5	7	15,418	1.42	1.27
1868	719	0	4	1,012	14	4	8,008	1.79	1.61	
1869	1,394	16	0	1,735	16	1	17,576	1.58	1.42	
1870	2,051	15	3	2,644	15	12	20,254	2.02	1.81	
1871	1,718	12	12	1,374	1	4	4	13,494	2.54	2.28
1872	1,014	11	10	793	1	5	14	8,580	2.36	2.12
1873	998	2	17	662	1	10	3	6,994	2.85	2.46
1874	665	8	11	527	1	5	6	3,420	3.86	3.27
1875	915	8	3	550	1	13	6	6,100	3.00	2.70
1876	1,953	5	23	1,705	1	2	21	15,757	2.47	2.22
1877	2,527	19	13	2,015	1	5	2	14,144	3.57	3.21
1878	1,737	9	9	1,808	19	5	10,599	3.27	2.95	
1879	1,600	17	0	1,787	17	22	5,322	6.00	5.41	

## RENFREW.

Year,	Total ounces of Gold extracted.			Stuff crushed.	Yield per ton of 2000 lbs.			Total days' Labor.	Average yield per man per day in dwt. at \$0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwt.	\$
1862	808	8	0	171	1	15	10	10,920	.56	.50
1863	785	7	7	575	1	7	7	21,216	.74	.66
1864	1,172	6	5	1,229		19	1	12,220	1.91	1.71
1865	1,008	10	18	927	1	1	18	14,430	1.39	1.25
1866	6,423	15	11	6,003	1	1	9	38,142	3.36	3.02
1867	7,901	19	2	7,222	1	2	4	61,308	2.57	2.31
1868	3,373	14	9	5,994		11	6	39,598	1.70	1.53
1869	3,097	15	7	7,258		8	12	34,606	1.79	1.61
1870	1,171	18	11	3,243		7	2	11,310	2.07	1.86
1871	1,179	17	16	2,463		9	4	10,972	2.15	1.93
1872	323	3	8	855		7	13	5,668	1.14	1.02
1873	59	16	18	255		4	16	2,028	.59	.53
1874	3	3	7	10		6	7	190	.33	.29
1875	47	16	6	113		8	11	690	1.38	1.24
1876	75	14	10	164		9	5	1,307	1.15	1.03
1877	207	13	4	294		14	3	3,543	1.19	1.05
1878	155	17	10	380		8	5	1,769	1.76	1.58
1879	104	1	20	419		5	0	734	2.93	2.64

## SHERBROOKE.

1862	2,023	0	0	663	3	1	0	22,464	1.80	\$1.62
1863	3,304	14	12	3,454		19	8	31,200	2.11	1.89
1864	3,419	14	20	2,673	1	6	8	32,630	2.09	1.88
1865	3,424	1	21	2,511	1	7	6	23,010	2.97	2.67
1866	5,829	13	8	2,853	2	0	20	22,490	5.18	4.66
1867	9,463	18	0	7,378	1	5	15	35,958	5.31	4.78
1868	7,070	0	5	9,880		14	7	59,540	2.37	2.13
1869	5,546	11	16	11,500		9	15	41,964	2.64	2.37
1870	7,134	4	0	11,428		12	11	48,880	2.91	2.61
1871	6,579	19	7	13,882		9	9	50,856	2.58	2.32
1872	4,188	9	21	5,243		15	17	38,246	2.21	1.98
1873	5,026	0	4	7,187		15	9	31,460	3.19	2.87
1874	4,037	1	2	5,430		14	20	31,199	2.58	2.32
1875	5,818	15	10	6,443		18	1	38,683	3.00	2.70
1876	5,176	15	15	6,205		16	16	37,269	2.77	2.49
1877	8,237	3	10	8,654		19	1	47,725	3.45	3.10
1878	6,843	1	15	9,340		14	17	50,827	2.69	2.42
1879	7,389	17	15	9,209		16	1	44,965	3.30	2.97

## STORMONT.

Year.	Total ounces of Gold extracted.			Stuff crushed.	Yield per Ton. of 2000 lbs.			Total days' Labor.	Average yield per man per day in dwts. at \$0.90.	
	Oz.	Dwt.	Gr.		Oz.	Dwt.	Gr.		Dwt.	\$
1862	397	0	0	197	2	0	7	12,792	.62	\$ .55
1863	1,587	13	12	526	3	0	7	15,600	2.03	1.82
1864	1,510	4	21	636	2	7	11	25,844	1.16	1.04
1865	1,696	6	2	1,040	1	12	14	25,350	1.29	1.16
1866	1,254	17	9	2,253		11	2	11,208	2.23	2.00
1867	1,266	16	15	782	1	11	3	12,428	2.03	1.82
1868	673	2	17	596	1	2	14	14,560	.92	.82
1869	227	0	13	590		7	16	6,110	.74	.66
1870	578	5	15	1,525		7	13	6,552	1.76	1.58
1871	559	7	21	1,937		5	18	5,590	2.00	1.80
1872	472	0	11	543		17	9	4,316	2.18	1.96
1873	37	18	5	181		4	4	832	.91	.81
1874	167	19	20	236		14	5	1,799	1.86	1.67
1875	267	6	18	620		8	14	2,543	2.10	1.89
1876	267	0	5	370		14	10	3,607	1.48	1.33
1877	240	19	0	93	2	10	4	3,310	1.45	1.30
1878	106	10	0	74	1	8	19	3,015	.71	.64
1879	198	15	0	124	1	11	6	3,447	1.14	1.03

## TANGIER.

1862	865	0	0	707	1	4	11	39,000	.41	\$ .39
1863	494	7	21	655		15	2	37,440	.26	.23
1864	602	7	8	698		18	10	16,380	.74	.66
1865	644	7	18	639	1	0	4	13,156	.97	.87
1866	296	5	21	791		7	11	9,074	.65	.58
1867	691	1	7	724		19	2	6,864	2.01	1.80
1868	921	8	9	725	1	4	7	11,700	1.57	1.35
1869	1,192	3	10	1,332		17	21	15,938	1.49	1.34
1870	1,814	2	10	2,732		13	6	29,328	1.23	1.11
1871	2,095	0	7	2,924		14	7	27,326	1.53	1.38
1872	829	8	15	1,622		10	5	10,426	1.59	1.43
1873	726	11	15	1,070		13	4	8,892	1.63	1.46
1874	419	7	5	706		11	21	5,092	1.64	1.47
1875	448	2	15	1,106		8	1	6,667	1.34	1.21
1876	312	13	0	716		10	6	8,274	.92	.82
1877	410	14	15	364	1	2	13	5,102	1.61	1.42
1878	584	10	22	1,035		11	7	10,146	1.15	1.03
1879	857	7	12	1,464		10	6	9,267	1.84	1.66

## UNIACKE.

YEAR.	Total ounces of Gold extracted.			Stuff crushed.	Yield per Ton of 2000 lbs.			Total days' Labor.	Average yield per man per day in dwt. at \$0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwt.	
1866	72	16	9	28	2	12	0	1,326	1.09	\$ .98
1867	1,622	13	20	1,968		16	12	14,274	2.27	2.04
1868	3,247	3	17	3,874		16	16	27,898	2.32	2.08
1869	1,867	3	12	3,172		11	18	22,022	1.69	1.52
1870	566	14	5	1,794		6	7	6,214	1.82	1.63
1871	360	17	3	900		8	0	4,342	1.66	1.49
1872	241	10	0	364		13	7	1,950	2.47	2.22
1873	129	8	18	198		13	1	1,222	2.52	2.26
1874	14	1	0	19		14	19	60	4.68	3.81
1875	139	3	3	319		8	17	2,643	1.05	.94
1876	227	14	10	321		14	4	4,752	.96	.86
1877	663	15	9	470	1	8	6	7,252	1.83	1.64
1878	629	5	7	704		17	21	5,711	2.20	1.98
1879	787	18	0	744	1	1	4	7,775	2.02	1.82

## WAVERLEY.

1862	1,507	0	0	3,741		8	1	46,800	.66	\$ .59
1863	2,380	6	3	6,755		7	1	58,344	.81	.72
1864	6,410	4	22	9,238		13	23	88,244	1.44	1.29
1865	14,404	4	9	12,518	1	3	0	87,308	3.29	2.96
1866	8,612	17	11	16,750		10	6	98,800	1.74	1.56
1867	3,942	5	2	10,510		7	12	46,436	1.69	1.52
1868	2,387	8	22	6,372		7	11	36,972	1.26	1.13
1869	1,591	14	10	3,915		8	3	16,796	1.89	1.70
1870	811	3	21	2,619		6	4	13,546	1.19	1.07
1871	1,427	18	12	2,772		10	6	17,472	1.62	1.45
1872	1,047	17	0	1,761		11	21	12,766	1.64	1.47
1873	1,009	0	0	2,013		10	0	13,520	1.49	1.34
1874	1,553	12	15	1,682		18	11	12,541	2.47	2.22
1875	1,740	1	0	1,313	1	6	12	18,807	1.85	1.66
1876	1,539	7	0	1,661		18	12	21,107	1.45	1.30
1877	866	18	10	1,422		12	4	14,261	1.21	1.09
1878	498	12	8	1,197		8	8	6,727	1.48	1.33
1879	116	11	1	442	0	5	7	2,922	.78	.71

## WINE HARBOR.

YEAR.	Total ounces of Gold extracted.			Stuff crushed.	Yield per ton of 2000 lbs.			Total days' Labor.	Average yield per man per day in dwt. at \$0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwt.	\$
1862	1,688	0	0	835	2	0	10	12,792	2.63	\$ 2.36
1863	3,718	2	19	3,644	1	0	10	36,688	2.02	1.81
1864	4,033	3	7	4,136		19	12	22,984	3.50	3.15
1865	2,200	5	14	3,833		11	11	16,588	2.65	2.38
1866	1,012	8	4	1,881		10	18	8,814	2.29	2.06
1867	845	18	14	1,670		10	3	13,390	1.26	1.13
1868	1,248	6	3	2,938		8	12	23,166	1.00	90
1869	719	8	19	2,726		5	6	20,462	.70	.63
1870	914	15	14	2,356		7	17	8,034	2.27	2.04
1871	1,538	6	16	2,927		10	4	11,232	2.74	2.46
1872	2,572	10	18	2,305	1	2	7	8,840	5.82	2.23
1873	2,000	0	3	2,267		17	15	12,688	3.15	2.83
1874	633	11	6	1,193		10	14	5,605	2.26	2.03
1875	492	11	22	1,140		8	15	3,942	2.49	2.24
1876	1,217	19	7	1,929		12	15	7,818	3.10	2.79
1877	580	14	3	1,068		10	21	5,772	2.01	1.80
1878	492	13	12	814		12	2	4,471	2.20	1.98
1879	427	5	6	424	1	0	0	3,161	2.66	2.40

## OTHER DISTRICTS.

1862	436	0	0	75	5	19	10	6,864	1.26	\$1.13
1863	141	3	2	225		12	13	6,552	.43	.38
1864	66	12	0	38	1	15	0	4,992	.27	.24
1865	47	3	8	102		9	6	2,470	.38	.84
1866	248	10	19	250		19	23	4,550	1.09	.98
1867	36	6	17	16	2	9	3	4,992	.15	.13
1868	316	6	22	518		12	5	12,636	.50	.45
1869	424	12	15	761		11	3	15,444	.54	.48
1870	378	5	15	812		9	7	7,956	.95	.85
1871	112	2	16	281		8	0	2,808	.79	.71
1872	402	0	13	2,552		3	3	5,668	1.41	1.26
1873	407	9	13	3,175		2	13	4,550	1.79	1.61
1874	622	16	18	3,212		3	21	7,327	1.70	1.53
1875	604	18	2	2,766		4	9	5,422	2.23	2.00
1876	331	17	17	1,796		3	14	3,978	1.67	1.50
1877	499	13	1	1,196		8	3	6,473	1.54	1.39
1878	344	2	7	1,517		4	13	5,904	1.16	1.04
1879	74	2	22	57	1	6	0	1,242	1.11	1.00

*Statement of Coals (in tons) received at the several Stations from Mines in Nova Scotia for the year ending 31st December, 1879.*

STATIONS.	QUANTITY.	STATIONS.	QUANTITY.
Halifax .....	23,040	<i>Bro't forward..</i>	124,485
Bedford .....	118	Sussex .....	372
Windsor Junction...	2,160	Apohaqui .....	28
Wellington .....	18	Norton .....	32
Enfield .....	30	Bloomfield.....	12
Elmsdale .....	48	Hampton .....	354
Milford .....	42	Rothsay .....	222
Shubenacadie .....	292	Coldbrook .....	642
Stewiacke .....	208	St. John .....	3,130
Brookfield .....	58	Chatham .....	34
Truro .....	6,421	Newcastle .....	66
Valley .....	6	Bathurst .....	30
West River.....	20	New Mills.....	12
Glengarry .....	20	Charlo .....	6
Hopewell .....	158	Dalhousie .....	6
New Glasgow.....	5,560	Campbellton .....	32
Pictou Landing.....	49,440	Rimouski .....	290
Belmont .....	16	Riviere du Loup....	450
Debert.....	52	Chaudiere Junction..	570
Londonderry.....	27,900	Three-mile House....	858
Wentworth .....	12	Logan's Siding.....	30
Greenville .....	28	Four-mile House....	20
Thompson .....	12	Moir's .....	10
Oxford.....	198	Rocky Lake .....	116
Athol .....	12	Waterloo .....	6
Maccan .....	6	Grand Lake.....	6
Amherst .....	1,608	Oakfield .....	32
Aulac .....	64	Malcolm's .....	270
Sackville .....	1,216	Battery Hill .....	16
Dorchester .....	1,030	West Chester.....	6
Rockland .....	100	Nappan .....	42
Memramcook .....	12	Pergsley's .....	18
Shediac .....	72	Fort Lawrence.....	6
Point du Chene.....	20	Crowson's .....	6
Moncton .....	2,334	Calhoun's .....	6
Salisbury .....	1,916	Humphrey's .....	10
Petitcodiac .....	198		
Penobsquis. ....	40		
<i>Carried forward..</i>	124,485	<i>Total .....</i>	141,231



## INTERCOLONIAL RAILWAY.

*Statement showing the quantities, in tons, of the different kinds of Coal received from various Mines for the use of the Intercolonial Railway during the year 1879.*

MONTHS.	Drummond.	Vale.	Albion.			Acadia.	Spring Hill.
			Round.	Small.	Coke.		
January.....	1,800	.....	.....	10	20	69	3,939
February.....	2,127	.....	.....	.....	.....	.....	2,860
March.....	1,967	.....	.....	.....	.....	.....	2,584
April.....	2,036	.....	.....	.....	.....	.....	3,261
May.....	1,148	.....	.....	52	.....	.....	3,478
June.....	1,252	.....	.....	9	10	.....	4,084
July.....	1,024	.....	.....	.....	10	.....	5,478
August.....	2,853	.....	52	10	.....	.....	165
September....	1,173	970	261	82	.....	.....	8,097
October.....	1,468	30	.....	110	10	.....	5,780
November.....	1,706	.....	.....	175	.....	10	5,959
December.....	.....	1,501	180	75	.....	72	6,201
Totals.....	18,554	2,501	493	523	50	151	51,916

General Storekeeper's Office,  
Moncton, N. B., 10th February, 1880.

L. B. ARCHIBALD,  
General Storekeeper.

COAL.		COKE.	
<i>Forwarded from the following Stations:</i>		<i>Forwarded from the Albion Mines:</i>	
STATIONS.	Quantity.	STATIONS.	Tons.
New Glasgow.....	31,408	Halifax.....	80
Stellarton.....	57,796	Truro.....	50
Spring Hill.....	24,370	New Glasgow.....	40
Drummond.....	23,403	Stewiacke.....	30
Albion.....	3,814	Amherst.....	6
Maccan.....	440	Sackville.....	10
		River du Loup....	20
		Chaudiere Junction	430
		Londonderry.....	7,650
Total.....	141,231	Total.....	8,316

E. &amp; O. E.

MONCTON, N. B.,  
23rd January, 1880.

J. J. WALLACE,  
*Traffic Auditor.*

### MINERALS OTHERS THAN THOSE LEASED FROM THE CROWN.

#### GYPSUM EXPORTS—Tons of 2,000 lbs.

Windsor.....	Tons	50,450	Value.....	\$41,697
Cheverie.....	"	34,538	".....	23,774
Maitland.....	"	200	".....	140
Walton.....	"	3,635	".....	2,470
Hantsport.....	"	1,415	".....	1,302
Antigonish.....	"	1,373*	".....	2,834
Wallace.....	"	55*	".....	50
Baddeck.....	"	{ 2,385	".....	1,836 (?)
		{ 1,075*	".....	820 (?)
		95,126		\$74,923

Walton—Ground Gypsum ..Tons 50\*      Value..\$ 225

#### MANGANESE EXPORTS.—Stephens' Mine, Tenny Cape.

No. 1 ore.....	Tons	90	Value.....	\$ 4,950
" 2 ".....	"	55	".....	2,220
		145		\$ 7,170

\* Newfoundland and the Dominion.

BARYTES EXPORTS—River John.

Tons.....	480	Value.....	\$ 2,400
-----------	-----	------------	----------

BUILDING STONES.

Antigonish .....	Tons	18*	Value.....	\$ 47
Wallace .....	"	{ 4,569*	" .....	13,791
		{ 1,975	" .....	7,900
		5,562		\$21,638

MANUFACTURED STONE.

Seaman's Cove—Grindstone.....	Tons	{ 1,200	Value....	\$ 15,400
		200*	" ....	2,800
" " Scythe Stones..	boxes	1,000	" ....	1,000
Parrsboro—Grindstones .....	Tons	270	" ....	1,890
				\$21,090

LIMESTONE AS FLUX.

Tons.....	7,000	Value.....	\$ 14,000 (?)
-----------	-------	------------	---------------

IRON MINING.

Iron Ore.....	Tons	29,889
Ankerite.....	"	2,444

Average force employed daily :

Below ground—Miners.....	41
" " Laborers.....	48
" " Boys .....	5
Above ground—Mechanics .....	6
" " Laborers .....	14
" " Boys .....	3

\* Newfoundland and the Dominion.

## FINANCIAL STATEMENT—GOLD.

Mines Department for Twelve Months ended December 31st, 1879.

DISTRICTS.	RECEIPTS.			EXPENDITURE.			
	Rents.	Royalty.	Totals.	Return Rents.	Royalty Commission.	Salaries and Surveys.	Totals.
Caribou .....	\$82.00	\$ 165.45	\$ 247.45	.....	\$5.81	\$30.00	\$35.81
Fifteen Mile Stream .....	.....	4.47	4.47	.....	.....	.....	.....
Gays' River .....	.....	14.88	14.88	.....	.92	.....	.92
Lawrencetown .....	.....	9.15	9.15	.....	.....	.....	.....
Montagu .....	96.00	507.30	603.30	.....	17.22	33.80	51.02
Oldham .....	136.00	579.40	715.40	14.00	27.54	10.00	51.54
Ovens .....	16.00	.....	16.00	.....	.....	.....	.....
Renfrew .....	62.00	55.96	117.96	.....	.....	.....	.....
Sherbrooke .....	206.00	2,724.13	2,930.13	.....	137.85	720.00	857.85
Stormont .....	12.00	1.78	13.78	.....	.....	.....	.....
Tangier .....	10.00	316.55	326.55	.....	11.74	.....	11.74
Uniacke .....	18.00	268.34	286.34	.....	4.33	.....	4.33
Wagamatcook .....	2.00	.....	2.00	.....	.....	.....	.....
Waverly .....	10.00	51.95	61.95	.....	3.09	.....	3.09
Wine Harbour .....	4.00	32.40	36.40	.....	1.62	.....	1.62
Unproclaimed, &c .....	416.00	.....	416.00	.....	.....	.....	.....
Prospecting Licenses .....	.....	.....	986.65	.....	.....	.....	.....
	\$1,070.00	\$4,731.76	\$6,788.41	\$14.00	\$210.12	\$793.80	\$1017.92



ABSTRACT ACCOUNT.

RECEIPTS AND EXPENDITURE for the 12 months ended December 31st, 1879.

RECEIPTS.	EXPENDITURE.
Licenses to Search Coal.....	Return Rents.....Gold ... \$ 14.00
“ Work ..... 325.00	Royalty Commission ..... 210.12
Royalty ..... 40,840.95	Salaries and Surveys..... 793.80
	\$1,017.92
Rents.....Gold..... 1,070.00	General Expenses..... 3,860.02
Royalty ..... 4,731.76	Postage..... 62.88
Prospecting Licences ..... 986.65	Stationery and Printing..... 143.46
	4,066.36
	\$5,084.28







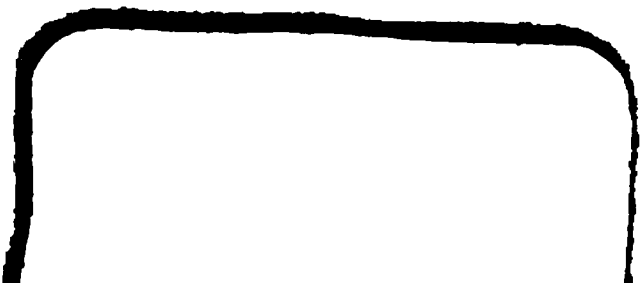








80. FLU ...





80. FLO. 184. 2

